JPRS 79729

24 December 1981

USSR Report

CHEMISTRY

No. 79

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 79729

24 December 1981

USSR REPORT

CHEMISTRY

No. 79

CONTENTS

ADSORPTION

Effect of Surface Active Agents on Physical-Chemical Properties of Ion Exchange Membranes........................... 1

ALKALOIDS

Concentration of Biologically Active Compounds During Their Extraction From Vegetables................................... 2

BIOCHEMISTRY

Physical Chemical Problems of Energy Conversion by Biocatalytic Systems: 2. Bioelectrocatalysis............................... 3

CHEMICAL INDUSTRY

Important Chemistry of Severodonetsk Branch of GIAP.............. 4

Superphosphate Fertilizer Plant Construction Moves Slowly......... 4

Basic Directions for Socialist Competition in Chemical Fiber Industry During 11th Five-Year Plan............................ 5

Basic Directions in Work of Klin Industrial Association 'Khimvolokno' on Curtailment of Manual Labor................... 5

COAL GASIFICATION

Semicoke Gasification and Purification of Production Gases at 'Angarsknefteorgsintez' Production Association.................. 7

Prospects for Producing Energy Gas From Multisulfur Shale Fuels of the Volga Region... 7

[III - USSR - 21B S&T]

ELECTROCHEMISTRY

Electric Conductivity of Molten Mixtures of Uranium, Thorium, Beryllium and Sodium Fluorides.................................... 9

FERTILIZERS

New Stores of 'Fertility Stones' (Phosphate Rock)................. 10

Basic Directions of Work of State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis in Developing Nitrogen Industry During Current Five-Year Plan.................................... 10

Personnel of Scientific and Planning Subdivisions of GIAP......... 11

Physical Chemical Research at GIAP................................ 11

Role of Dzerzhinsk Branch of GIAP in Developing Nitrogen Industry... 12

Scientific and Technical Progress in Nitric Acid and Mineral Fertilizer Production.. 12

INORGANIC COMPOUNDS

Electrode Potentials and Complex Formation With Trivalent Uranium in 3LiCl(LiF)-2KCl Melt.. 13

Potentiostatic Study of Uranium Electrodeposition on Liquid Aluminum.. 14

ION EXCHANGE PHENOMENA

Ionic and Electronic Permeability of Ag_2S Membranes of Ion Selective Electrodes.. 15

NITROGEN COMPOUNDS

Oxides of Dialkyl(Diaryl)[Dialkylcarbamoylmethyl]Phosphines....... 16

Reaction of Dicyclohexylcarbodiimide With Carboxymethyltriphenylphosphonium Chloride......................... 16

Structure and Reactivity of Aminophosphoranyl Radicals Orthophenylene(Alkylamido)Phosphite Derivatives................. 17

Structure and Conformation of Stereoisomeric 1,5;2,3-Bis-O-(N-Diethylamidothionophosphate)-Beta-D-Ribofuranosides on Basis of ^1H, ^{31}P and ^{13}C NMR Data.......................... 18

Reaction of Phosphorous Acid Esters With Alpha-Fluorocarbonyl Compounds.. 18

Synthesis and Certain Properties of 2-Substituted, 4,5-Benzo-1,3,2-Thiazaphospholanes.............................. 19

Interaction of 2-Phenyl(Acetyl)-5-Methyldiazaphosphols With Diazomethane and Diazofluorene.................................. 20

Reaction of Dichlorothiophosphorylphosphorimide Trichloride With Nucleophilic Reagents.................................... 20

Interaction of 2-Trimethylsiloxy-1,3,2-Oxazaphospholanes With Phenol and Ethanol.. 21

Nonequivalence of Beta Hydrogens in Nitroxide Radicals $(Me_2N)_2P(O)N(Me)CH_2N(O)R$.................................. 22

Reaction of Diphenylamidophosphate With Phosphorus Pentachloride.. 22

ORGANOMETALLIC COMPOUNDS

Synthesis and Some Transformations of 1- and 9-o- and m-Carboranyldichloroarsines.................................... 23

Thermochemical Investigation of Coordination Capability of Some Organic Arsenic Compounds.................................. 24

ORGANOPHOSPHORUS COMPOUNDS

Kinetics of Alkaline Hydrolysis of Phenyl Esters of Dimethylthionphosphinic Acid in Water-Dioxane Mixtures.......... 25

Conformational Analysis of Dimethyl(Bromomethyl)- and Dimethyl(Iodomethyl)Phosphinic Oxides.......................... 26

Acid and Alkaline Catalysis in Exchange Reactions of Phosphorous Acid Thioethers...................................... 26

Isomer Composition of Electrochemically Synthesized Alkylphenylphosphonates.. 27

Reaction of Monothiophosphoric Acids With Oxetanes................ 27

Rearrangement of 2-Oxyalkyl Esters of Diphenylthio- and Selenophosphoric Acid.. 28

Synthesis and Structure of Diphospholenebutadienes................ 28

Stereoselectivity in Series of O,O-Bis(Alpha-Polyfluoroalkylbenzyl)Methylphosphonates........................ 29

Vibrational Spectra and Conformation of 2-Methyl-2-Seleno-1,3,2-Dioxaphosphorinanes.................................. 29

Synthesis of Quaternary Phosphonium Salts and Esters of Phosphonic Acid With Conjugated Diene Grouping................. 30

Acid-Base Properties of Some Phosphorus-Containing Compounds...... 30

Synthesis and Study of Phenoxycyclotriphosphazines................ 31

Synthesis and Chemical Transformations of Dichloroanhydride of 2-Chloro-2-(1-Cyclohexanyl)-Ethenephosphonic Acid............... 31

Splitting Cyclosiloxanes by Chlorosilanes in Presence of Phosphoric Acid.. 32

Homolytic Addition of Dialkylphosphites to 1,4-Dimethoxy-2-Butine.. 32

New Method of Synthesizing Phosphorylated Formals................ 33

Regrouping of Thionphosphazo Compounds With P-P Bond to Amidophosphites.. 33

5-Ethyl-10-Phenyl-10-Thiono-5,10-Dihydrophenophosphazine.......... 34

Cyclic Phosphorus-Containing Acetals, Derivatives of Tetrahydrofuran.. 34

Synthesis and Structure of Derivatives of 3,4-Dichloro-1, 3-Butadiene-2-Phosphonic Acid...................................... 35

Synthesis and Reactions of Bis(Diphenylphosphido) and Bis(Triphenylsilyl) Niobocene..................................... 35

Interaction of Imidophosphenous Acid Amides With Compounds Containing Mobile Proton: I. Phosphorus-Nitrogen Diad Prototropic Tautomery in Series of Products of Attachment of Alcohols, Thiols and Amines to Imidophosphenous Acid Amides.. 36

Thermolysis of Phosphonous Acids................................. 36

Mechanism of Phosphorylation of Pentachlorite Alkenes by Phosphorus... 37

Ionization Potentials of Electron and Spatial Structure of Trivalent Phosphorous Acid Diesters and Triesters.............. 37

Interaction of Esters of Acids of Trivalent Phosphorus With Polyhalogen Methanes: Correlation Equations.................... 38

Mass Spectra of 1-Methyl-5-Organyl-1-Oxo-2,8-Dioxa-5-Aza-1-Phosphacyclooctanes.. 39

Chemical Transformation of Phosphoric Acid Hydrazides: II. Interaction of Phosphoric Acid Hydrazides With Monosaccharides.. 39

1,2-O-Isopropylidene-α-D-Xylofuranose Cyclophosphites............ 40

Stereospecific Transition From Phenyl-1-Naphthylthiophosphinic Acid to Thioethyl, Methyl Esters and Diethyl Amide of Phenyl-1-Naphthylphosphinic Acid................................ 40

Some Properties of New Representatives of Cyclic Phosphorus Dithio-Acids.. 41

Phosphorylation of 2,2,6,6-Tetramethyl-4-Oxypiperadine-1-Oxyl by Diamidophosphenic Acid Amides................................ 41

PESTICIDES

Physicochemical Properties of Defoliants Based on Magnesium Chlorate and Components of Mineral Fertilizers (Type UDM)....... 42

Method for Separate Determination of Atrazine, Prometryn and Simazine in Air in Production of Combined Preparations 'Agelon' and 'Sitrin'.. 43

PETROLEUM PROCESSING TECHNOLOGY

Polycyclic Hydrocarbons From 450-520°C Fraction of Mangyshlak, Arlan and Samotlor Crude...................................... 44

Dehydrogenation of n-Dodecane on Aluminoplatinum Catalysts........ 45

Codimerization of Ethylene With Propylene in Presence of Gel-Immobilized Metallocomplex Systems............................... 45

Alkylation of Isobutane With Butenes in Presence of Zeolite HNaY, Modified by Cations of Nickel, Calcium and Rare Earth Elements.. 46

Alkylation of Isopentane With Ethylene in Presence of Aluminum Chloride--Diethyl Ether Complex................................ 46

Initiation of Thermal Degradation of 1-Hexene by Allene........... 47

Liquid-Phase Oxidation of Isobutane During Heterogeneous Catalysis With Cobalt and Molybdenum Borides and Molybdenum Carbide, Obtained by Self-Propagating High-Temperature Synthesis.. 47

Effectiveness of Inhibitors During Oxidation of Jet Fuel With Initiator.. 48

Synthesis and Study of Some Phenylacetothioamides as Lubricant Additives.. 48

Synthesis of Acrylonitrile From Acetonitrile and Methane.......... 49

Using Heterogenic Tin-Sodium-Crystalline Iodine Alloy System To Inhibit Processes of Oil Oxidation in Operating Internal Combustion Engine.. 49

Antioxidant Additives of New Type for Motor Fuels................. 50

Industrial Antioxidants for Fuels.................................. 50

Synthesis of Thiocarbamide Derivatives of 2,6-Di-tert-Butylphenol and Investigation of Their Effect on Antioxidation Stability of Jet Fuels.. 51

Investigating Composition of Antioxidation Additives To Stabilize Jet Fuels.. 51

Variation of Process of Producing Oxidized Shale Bitumens......... 52

Production of Hydrogen From Coking Gas by Short Cyclic Adsorption Method.. 52

Jet Fuel From Coal.. 53

Products of Shale Reprocessing Used as Diesel Fuels............... 53

Characteristics of Composition and Properties of Fuel Shales as Raw Material To Produce Synthetic Liquid Fuel.................... 54

Hydrocracking-Hydropurification of High-Sulfur Gasoline From Direct Distillation.. 54

Effect of Fractional Composition of Crude on Yield and Octane Number of Gasoline From Catalytic Reforming..................... 55

N'-Acyl Derivatives of N-Substituted Ureas Used as Stabilizers for Jet Fuels.. 55

Joint Thermal Hydrogenization Conversions of Aromatic and Nonaromatic Hydrocarbons.. 56

Conversion of Hydrocarbons During Hydrodearomatization of Kerosene Distillates.. 56

Classification of Mineral Working Fluids for Hydraulic Systems... 57

Synthesis of 2-Methyl-4-Alkyl(Aryl)Thiacyclohexanes............... 57

PHARMACOLOGY AND TOXICOLOGY

Annual General Meeting of Section of Biochemistry, Biophysics, and Chemistry of Physiologically Active Compounds, USSR Academy of Sciences.. 59

Toxicity and Maximum Permissible Concentration of Monoethanolamine for Biochemical Purification.................. 60

Biological Evaluation of Properties of Polymethyl Siloxanes Differing in Viscosity.. 60

Cellular and Subcellular Reactions in Studying Influence on Body of Low Concentrations of Toxic Substances...................... 61

New Data on Toxicity of Inorganic Compounds of Mercury and on Factors Responsible for It.................................... 62

POLYMERS AND POLYMERIZATION

Process of Producing Light-Focussing Polymer Components........... 63

Heat Resistant Polymeric Composition Material Rolivsan MV-1....... 64

Production of Epoxy Titanium-Containing Polymers in Presence of Amine Catalysts.. 64

Chemical Stability of PIK-220 Electric Insulating Impregnating Compound... 65

Influence of Test Conditions on Mechanical Properties of PIK-220.. 65

RUBBERS AND ELASTOMERS

Low-Temperature Postradiation Graft Polymerization of Tetrafluoroethylene to Polydimethylvinylsiloxane Rubber......... 66

Investigating Mechanochemical Changes of Structure of Vulcanized Rubber Based on Cis-Polybutadiene During Pulverization of It.... 66

Molecular Characteristics of Urethane Prepolymers Based on Oligodiene.......... 67

Effect of Technical Chlorinated Carbon on Crystallization of cis-Polybutadiene.......... 68

Properties of Vulcanizates and Rubber Mixtures Based on SKMS-30ARKM15, Modified With p-Nitrosodiphenylamine at Latex Stage.......... 68

Reaction of Oligodienediisocyanates With RU Products in Rubber Medium.......... 69

Use of Synthetic Latexes for Modification of Thiocol Air Tight Sealers.......... 69

Influence of Phosphorus-Containing Accelerators on Properties of SKEPT Vulcanizates.......... 70

Estimating Properties of SKEPT-40 Rubbers.......... 70

Influence of Molecular Mass of Mercaptan Regulation Polychloroprenes on Technological Properties.......... 71

Use of Hexachloroparaxylene in Rubber Mixtures Based on SKEPT With Butadiene Copolymers.......... 71

Influence of Mechanical Grinding of SKD and BSK Rubbers on Structure and Properties of Their Vulcanizates.......... 72

Properties of Sulfide Vulcanizates of SR Nairite.......... 72

Estimating Toxicity of Dimethylphenylcarbinol.......... 73

New Tire Designs and Their Efficient Use in the National Economy.......... 73

Properties of Acrylate Rubbers With Different Reactive Groups..... 74

Vulcanization of Fluorine Rubber SKF-26 by Thiourea Derivatives... 74

Determination of Degree of Cross-Linking in Elastomer Phases in Filled Sulfur Vulcanizates of Combinations of SKI-3 and SKMS-30ARK Rubbers.......... 75

Maleates as Plasticizers for Rubber Mixtures.......... 76

Life of Solid-Rubber Tires for Electric Loaders.......... 76

Production of Derivatives of Maleic Anhydride by Catalytic Oxidation of Halogen Butadienes.................................. 77

Production of Piperylene Epoxides.................................. 77

WATER TREATMENT

Decisions of 26th CPSU Congress Regarding Water Treatment Enacted.. 78

Mechanism of Interaction of Pesticides With Layer Silicates....... 79

Electrostatic Precipitation of Dispersions by Using Ion Exchange Membranes.. 80

Investigation of Diffusion of Ions in Purification of Water by Reverse Osmosis.. 81

Influence of Voltage and Rate of Flow on Transfer of Ions in Electrodialyzer.. 82

Decontamination of Waste Industrial Water Contaminated With Zineb... 83

UDC 621.359.7 + 628.163

EFFECT OF SURFACE ACTIVE AGENTS ON PHYSICAL-CHEMICAL PROPERTIES OF ION EXCHANGE MEMBRANES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 8, Aug 81 (manuscript received 8 Jan 80) pp 1025-1028

ZOLOTAREVA, R. I., KOTOV, V. V., MAKAROV, S. P. and KANAPUKHINA, T. N., Voronezh Technological Institute, Chair of Analytical Chemistry

[Abstract] In this paper results have been reported of the investigation of physical-chemical and mechanical properties of ion exchange membranes exposed to prolonged action of surface active agents (SAA). Long exposures to SAA at concentrations higher than the critical mycellae formation concentration (CCMF) led to pattial breakdown of some membranes: the samples warped, the ion exchange mass separated from the network and broke down. The breakdown began as a rule on the peripheries and worked its way towards the center. To test this more objectively, the tensile strength of the test samples was determined, and it supported the experimental observations. Treatment of ion exchange membranes by exposure to SSA at concentrations lower than CCMF had little effect on physical and chemical properties of these membranes, except that the exchange capacity was lowered because of the shielding effect of the SSA molecules on the ionogenic groups of these membranes. Figures 1; references 8: 6 Russian, 2 Western.
[12-7813]

UDC 547.94.07

CONCENTRATION OF BIOLOGICALLY ACTIVE COMPOUNDS DURING THEIR EXTRACTION FROM VEGETABLES

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 102, No 1, Apr 81 (manuscript received 16 Oct 80) pp 81-84

YAVICH, P. A., Institute of Pharmacochemistry imeni I. G. Kutateladze, GSSR Academy of Sciences

[Abstract] Extraction of biological material often yields highly diluted final products which then must be concentrated. Because the distillation of solvent is not always possible, two other methods are often used: extraction in a liquid-liquid system and the ion exchange method. Neither of these methods is completely satisfactory. In this paper the utilization of tannin-alkaloid complexes for this purpose has been evaluated. On the basis of pharmacologically pure synthetic models it was established that single complexes with low degree of dissociation were being formed; their composition varied depending on the pH of the medium. The use of tannin as a complexing agent for alkaloids made it possible to isolate them from the principal mass of accompanying substances, increasing their content in the extract ten-fold and more. The precipitation of tannin-alkaloid complexes from organic extracts was more effective than that from water solutions. Isolation of the alkaloid from the complex using organic solvents or buffer solutions is simple. The yield suffers when buffer solutions are used, but the selectivity is improved. Figures 1; references 10: 8 Russian, 2 Western.
[23-7813

UDC 541.128.1

PHYSICAL CHEMICAL PROBLEMS OF ENERGY CONVERSION BY BIOCATALYTIC SYSTEMS: 2. BIOELECTROCATALYSIS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 55, No 5, May 81
(manuscript received 21 Mar 80) pp 1118-1126

VARFOLOMEYEV, S. D., Moscow State University imeni M. V. Lomonosov

[Abstract] Systems for converting the energy of chemical reactions to electrochemical potential on the basis of using enzymes and the phenomenon of bioelectrocatalysis were analyzed. A kinetic model of bioelectrocatalysis and electron transfer between the active center of an enzyme and an electron-conducting matrix was investigated. The electrochemical oxidation of hydrogen and the electrochemical reduction of oxygen were considered as enzymatic systems for this process. The enzymes can oxidize various types of organic substrates such as alcohols and carbohydrates to develop bioelectrochemical energy converters. Electrochemical converters can also be developed with high specific characteristics due to the effectiveness of enzymes as catalysts. Earlier work by the author (1978, 1978) is cited on the use of conducting and semiconducting matrices for immobilization of enzymes in bioelectrocatalytic systems. Figures 1; references 28: 11 Russian, 17 Western.
[125-6521]

CHEMICAL INDUSTRY

UDC 661.5(477.4)

IMPORTANT CHEMISTRY OF SEVERODONETSK BRANCH OF GIAP

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 81 pp 228-229

SHTEFAN, S. M., director of Severodonetsk Branch, GIAP

[Abstract] The history and development of the Severodonetsk Branch of GIAP [State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis] are outlined with respect to the 30 years of its existence. The branch includes more than 20 planning departments, 10 scientific research laboratories and an experimental plant. New processes of methanol production are discussed with respect to the saving achieved up through 1980. Plans are outlined for construction of large units for sebacic acid production by the electrolysis method during the 11th Five-Year Plan. The contribution of branch workers in improving nitric acid, carbon-ammonium salt, ammonium and potassium nitrate production and other products and a new process of biological purification of waste water are discussed. The political and trade-union organization of the branch is outlined with respect to individual socialist competition and for developing the movement for communist labor.
[129-6521]

SUPERPHOSPHATE FERTILIZER PLANT CONSTRUCTION MOVES SLOWLY

Tashkent EKONOMIKA I ZHIZN' in Russian No 6, Jun 81 pp 49-52

BAZILEV, V., director of the Kokand Superphosphate Plant

[Abstract] Delays in the construction of the new Novokokand Chemical Plant in the Fergana valley, which is to supply fertilizer for the Kirghiz and Tajik SSRs and to replace the current outdated superphosphate plant, are delineated. The new plant, whose design by Uralgiprokhim [Ural State Union Institute for the Planning of Plants of the Basic Chemical Industry] was completed in 1977, is expected to produce more than 500,000 tons of sulfuric acid, more than 850,000 tons of liquid fertilizer concentrate and other fertilizers. The slow progress in construction is attributed to insufficient manpower and capital, design problems and lack of construction materials owing to unfilled orders. Suggestions are made for the completion of construction, since the current rate of progress will have detrimental effects on the local and general economy. [8-9307]

BASIC DIRECTIONS FOR SOCIALIST COMPETITION IN CHEMICAL FIBER INDUSTRY DURING 11TH FIVE-YEAR PLAN

Moscow KHIMICHESKIYE VOLOKNA in Russian No 4, Jul-Aug 81 pp 3-5

MILOVIDOVA, S. A. and SINDEYEVA, D. I.

[Abstract] "To Work Effectively and with Quality" is the motto of competition in the 11th Five-Year Plan, which resulted from the work of the 26th CPSU Congress. In the chemical fiber industry increased work quality, multi-machine operation and inspectional norms, more economical use of raw materials and energy, introduction of brigade workforce organization to stimulate production, elimination of lagging collectives and accelerated mastery of productive power are to receive attention. The experience of the Dynamo and Tasma (Kazan') factories in increasing productivity will be used. Mechanization and automation, like that of the Khimvolokno factory (Kalinin), worker training and motivational slogans will be employed. Recalculation of production norms based on multi-machine operation, involvement of workers in individual and collective competitions to improve quality and use of motivational honors and awards will be important. Introduction of brigade workforce organization has already improved productivity and worker responsibility for quality in many factories. Payment according to final results and competition for energy conservation will be expanded. The wider application of socialist competition will permit the successful accomplishment of the 11th Five-Year Plan. References 1: 1 Russian. [155-12126]

BASIC DIRECTIONS IN WORK OF KLIN INDUSTRIAL ASSOCIATION 'KHIMVOLOKNO' ON CURTAILMENT OF MANUAL LABOR

Moscow KHIMICHESKIYE VOLOKNA in Russian No 4, Jul-Qug 81 pp 6-7

TOROPOV, V. A.

[Abstract] When it was founded in 1931, the Khimvolokno plant used batch processing and manual transport of product between operations. In the past 50 years continuous operation, production lines, more powerful machines, complex mechanization and automation have reduced heavy manual labor requirements. Spinning, doubling, heat and power plants have been mechanized. A savings of 750,000 rubles has resulted from the 63.8% degree of mechanization. Automatic control of the plant by computer has been introduced, including work planning and material and product monitoring. Pneumatic, overhead, belt and bucket conveyers are

particularly valuable for viscose transport. Obsolete cloth filtration of viscose has been replaced by filtration through a packed layer of polyvinylchloride powder. The completely automated process avoids worker contact with viscose. Shipment of the product to the viscose centrifugal plant is also mechanized. In the caprolactam factory the warehouses, liquid caprolactam transport and prepared fiber movement are mechanized, as well as preparation of the reaction mixture for caprolactam polymerization. During the 11th Five-Year Plan the reconstruction of the caproic textile fiber plant, with more powerful equipment to produce polyamide granulate and conduct continuous polymerization, extraction and drying will be carried out. Viscose monomer distillation will also be improved. These types of changes require careful planning and consideration of the effects on the workforce and operation as a whole and must include worker involvement.
[155-12126]

COAL GASIFICATION

SEMICOKE GASIFICATION AND PURIFICATION OF PRODUCTION GASES AT 'ANGARSKNEFTEORGSINTEZ' PRODUCTION ASSOCIATION

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 3, May-Jun 81 pp 3-8

MATVEYEV, B. I., EPPEL', S. A., ZAYTSEV, A. V. and LANE, S. K.,
"Angarsknefteorgsintez" Production Association

[Abstract] The schemes and characteristics are presented for the basic equipment and engineering and economic indicators for generating production gases at the Production Association Angarsknefteorgsintez. The gas is produced by transport of the semicoke by belt conveyors from the semicoking shop to the gasification shop, loading of the fuel into the gas generator hoppers, steam-oxygen or steam-air gasification in gas generators, water cooling of the gas in scrubbers, purification of the gas of dust and resin and transport of the gas for subsequent stages of purification and production of initial gas mixtures for synthesis of methanol, ammonia and hydrogen. The gas generator consists of a vertical cylindrical shaft lined in its upper part with fire brick. The generation of production gases at the Production Association Angarsknefteorgsintez cannot increase hydrogen production without fundamental redesign of the production process. Generating the production gases by vapor-oxygen gasification of asphalt permits 700-600 workers to be freed, which is significant with a shortage of work force. Figures 1.
[124-6521]

PROSPECTS FOR PRODUCING ENERGY GAS FROM MULTISULFUR SHALE FUELS OF THE VOLGA REGION

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 3, May-Jun 81 pp 9-12

KASHIRSKIY, V. G. and KASHTANOV, V. V., Saratov Polytechnical Institute

[Abstract] Large reserves of fuel shales have been identified in Saratovskaya and Kuybyshevskaya Oblasts. The sulfut content of the shales was investigated from core samples and the sulfur distribution of the shale by types of compounds was analyzed as a function of the depth of the core sample. Some specimens of the shales are equivalent to fuel shales of the Baltic area in organic matter

content and heat of combustion, except for their higher sulfur content and lower carbonate content. An installation to produce a pure type of energy fuel by gasification is described. The organic matter undergoes more profound changes and the carbonates are more fully broken down upon pyrolysis in a cyclone reactor due to the longer stay of the particles in the high-temperature zone. The fuel shales from the Volga region are recommended for use in generators after the sulfur content of the shales has been reduced. Figures 3; references 3 (Russian).
[124-6521]

UDC 621.3.035.43:537.311.1:546.16

ELECTRIC CONDUCTIVITY OF MOLTEN MIXTURES OF URANIUM, THORIUM, BERYLLIUM AND SODIUM FLUORIDES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 7, Jul 81
(manuscript received 15 Apr 80) pp 1634-1637

DESYATNIK, V. N., KOVERDA, A. P., KURBATOV, N. N. and BYSTROV, V. V.,
Urals Polytechnical Institute

[Abstract] The temperature and concentration dependence of the specific electroconductivity of melts of the NaF-ThF_4-BeF_2 system and the range of low-melting compositions of the four-component NaF-ThF_4-BeF_2-UF_4 were investigated. Magnesium and beryllium oxide were used as the capillary material when measuring the specific electric conductivity of molten salt mixtures of the compounds by the relative capillary method. The coefficients of equalizing the temperature dependence of specific electric conductivity of melts of various fluoride systems are presented in tabular form. The isotherms of specific electric conductivity of the systems decreased as temperature increased. The electric conductivity of the mixtures also decreased as the fluoride concentration increased. Figures 3; references 8: 7 Russian, 1 Western.
[120-6521]

FERTILIZERS

NEW STORES OF 'FERTILITY STONES' (PHOSPHATE ROCK)

Tashkent EKONOMIKA I ZHIZH' in Russian No 6, Jun 81 p 40

KOVALEV, V., candidate of geomineralogical sciences

[Abstract] The geological history and working of phosphate rock ("fertility stones") deposits, which are the raw material for superphosphate production, in the southern USSR are briefly discussed. Studies by the Institute of Geology and Geophysics of the Uzbek Academy of Sciences revealed that phosphate rock was formed in areas covered by ocean millions of years ago. Such areas include Mangyshlak, the lower Amu-Dar'ya River, the central Kyzyl-Kums and southwestern ridges of the Gissar mountain range. The Dzheroy deposits of 140 million tons seem very promising. Phosphate rock from the Uzbek SSR is particularly advantageous, since it is more easily mined (open-pit mining) and produces quality superphosphate. The manufacture of fertilizer in the region where it is used also reduces transportation costs and use of transportation facilities.
[8-9307]

UDC 661.5"71"

BASIC DIRECTIONS OF WORK OF STATE SCIENTIFIC RESEARCH AND PLANNING INSTITUTE OF THE NITROGEN INDUSTRY AND PRODUCTS OF ORGANIC SYNTHESIS IN DEVELOPING NITROGEN INDUSTRY DURING CURRENT FIVE-YEAR PLAN

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 81 pp 198-202

ZAICHKO, N. D., director of GIAP

[Abstract] The plans of the State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis [GIAP] are outlined for developing the nitrogen industry during the current five-year plan. Design and draft documentation worth 2,825,300,000 rubles was issued to customers for construction objects. A total of 311 contract and contract-detail plans was confirmed for the 10th Five-Year Plan. Capital construction plans have been confirmed for nitrogen-related industries at Tol'yatti, Odessa, the Don area and Turkmen area. An increase in production of ammonium products is planned due to

introduction of large production units. Ammonium nitrate and potassium nitrate production will be increased and the capacities for producing these products will be increased. Nitric acid and nitrogen fertilizer production will be increased by introducing new and improved production processes and large-capacity production units.
[129-6521]

UDC 661.5.007:061.62(470.311)

PERSONNEL OF SCIENTIFIC AND PLANNING SUBDIVISIONS OF GIAP

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 81 pp 205-209

KORDIALIK, V. V., deputy director of GIAP

[Abstract] The personnel involved in expanding the production of ammonia, nitric acid, ammonium nitrate, methanol, explosive compounds and other nitrogen products are listed. Developers of a rhodium catalyst for oxidation of ammonium in nitrous oxide are commended for achieving a significant saving of rhodium as part of the platinum group. Plans are outlined for raising the qualifications of GIAP personnel in all types of training. Personnel training also includes economic education and scientific training. Quality control was organized in scientific research work for the enterprise. A socialist competition was organized on the theme of a worthy meeting of the 26th CPSU Congress.
[129-6521]

UDC [001.891:661.5](47+57-25)661.5.001.5:53/54

PHYSICAL CHEMICAL RESEARCH AT GIAP

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 81 pp 243-245

KRICHEVSKIY, I. R.

[Abstract] The dependence between the pressure, volume and temperature for clean gases and the dependence between pressure, volume, temperature and composition for gaseous solutions were investigated up to pressures on the order of 3,000 kgf/cm^2 and later up to 10,000 kgf/cm^2. The compressibility of pure helium, hydrogen, neon, nitrogen, argon, oxygen, methane, krypton, ammonia and other gas solutions was studied at pressures up to 20,000-25,000 kgf/cm^2. The effect of a foreign gas on the surface tension of a liquid was studied at low pressures through precise measurements. The effect of compressed gas on surface tension is very strong at higher pressures. Surface tension decreases significantly as pressure increases but the rate of decrease slows down as pressure increases. The thermodynamics of critical, infinitely diluted solutions was studied. The melamine-ammonia system was studied with respect to phase

equilibrium to help in industrial synthesis of melamine from dicandiamide. The leading researchers that have worked in the laboratories of GIAP over the last 50 years are listed. References 8 (Russian).
[129-6521]

UDC 661.5[470.341-21]

ROLE OF DZERZHINSK BRANCH OF GIAP IN DEVELOPING NITROGEN INDUSTRY

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 81 pp 232-235

LEBEDEV, V. V.

[Abstract] The role of the Dzerzhinsk Branch of GIAP is outlined with respect to development and improvement of carbamide production and production of other products based on it such as melamine and other symmetrical triazines, complex fertilizers and feed substances as well as calcium cyanamide and its derivatives of dicyandiamide and melamine. Production figures and plant capacities are given for nitrogen product output. Measures were developed and introduced to further improve the technology and equipment formulation of the production process toward stabilization of the mode, reduction of energy consumption, prevention of corrosion and elimination of discharge of noxious substances into the environment. References 35 (Russian).
[129-6521]

UDC [661.565+631.8]"71"

SCIENTIFIC AND TECHNICAL PROGRESS IN NITRIC ACID AND MINERAL FERTILIZER PRODUCTION

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 81 pp 218-225

BELYAYEV, N. I., OLEVSKIY, V. M., POLYAKOV, N. N. and FERD, M. L.

[Abstract] The history of nitric acid and mineral fertilizer production is outlined with respect to its development in the USSR. The development and improvement of various catalysts used in nitric acid production is discussed. The production of ammonium nitrate as a nitrogen fertilizer is outlined with respect to its increased development since 1950.
[129-6521]

INORGANIC COMPOUNDS

UDC 541.135.3

ELECTRODE POTENTIALS AND COMPLEX FORMATION WITH TRIVALENT URANIUM IN 3LiCl(LiF)-2KCl MELT

Moscow ELEKTROKHIMIYA in Russian Vol 17, No 8, Aug 81
(manuscript received 28 Jul 80) pp 1160-1166

KOMAROV, V. Ye. and MITYAYEV, V. S., Institute of Electrochemistry, Ural Scientific Center, USSR Academy of Sciences, Sverdlovsk

[Abstract] In order to study the effect of cation nature on complex stability, the equilibrium electrode potential of trivalent uranium was measured in 3LiCl (LiF)-2KCl. The electromotive force between the uranium and fluorine electrodes was determined at 600, 700 and 800° with a uranium concentration of 0.47 mole % and fluorine concentration of 4-31 mole %. Using an anode solution of the metal and the chloride reference electrode as the cathode, current yield indicated that the uranium is converted to the trivalent form. The mean number of fluoride ligands complexed with the uranium was found graphically to be 3-3.8, suggesting the presence of UF_3 and UF_4^-. The relative amount of the two and equilibrium constants for their formation were calculated from the data. Less UF_4^- is seen at 700° than at 600°. Only UF_3 is found at 800°. Empirical equations for the dependence of formation constants on temperature were developed and used to evaluate the change in Gibbs free energy. Comparison of the present results to those obtained with NaCl(NaF)-KCl, LiCl-LiF and CsCl-CsF indicates that the number of ligands complexed with the trivalent uranium and relative complex stability increase with increasing ionic radius of the salt-solvent cation. Figures 3; references 19: 18 Russian, 1 Western.
[147-12126]

UDC 541.185.3+546.621.791

POTENTIOSTATIC STUDY OF URANIUM ELECTRODEPOSITION ON LIQUID ALUMINUM

Moscow ELEKTROKHIMIYA in Russian Vol 17, No 8, Aug 81
(manuscript received 6 Nov 80) pp 1267-1272

GOL'DSHTEYN, S. L., GUDKOV, S. V., RASPOPIN, S. P., SERGEYEV, V. L. and FEDOROV, V. A., Ural Polytechnic Institute imeni S. M. Kirov, Sverdlovsk

[Abstract] The potentiostatic method was used to evaluate the parameters and state of uranium electrodeposition from KCl-NaCl onto liquid aluminum at 973°K, in an argon atmosphere. Two types of current-versus-time curves were seen, corresponding to homogeneous and heterophasic cathode products. The damping coefficient, initial current and concentration as a function of electrode potential permit the definition of four static states, connected with individual electrode reactions or transitions. The first state involves the current-free transfer of uranium into the aluminum melt, together with electrodeposition. During the second state only electrodeposition occurs. Comparison with results from commutator and oscillographic methods and with calculated limiting currents confirms that the rate of the process is initially limited by difficulty in the transfer of uranium ions to the cathode surface. After ten seconds mass transfer of uranium into the liquid aluminum is limiting. In the third static state supercharging to more electropositive ions is seen, while in the fourth state uranium discharge to the metal is observed. The data indicate the utility of the potentiostatic method for obtaining the parameters and states of this system. Figures 4; references 16 (Russian).
[147-12126]

UDC 543.257.2:537.311.3:541.135.4

IONIC AND ELECTRONIC PERMEABILITY OF Ag_2S MEMBRANES OF ION SELECTIVE ELECTRODES

Moscow ELEKTROKHIMIYA in Russian Vol 17, No 9, Sep 81
(manuscript received 16 Jun 80, after revision 13 Feb 81) pp 1301-1307

VLASOV, Yu. G. and YERMOLENKO, Yu. Ye., Leningrad State University
imeni A. A. Zhdanov

[Abstract] The goal of this study was to determine the total (σ_{tot}), electronic (σ_{el}) and ionic (σ_{ion}) conductivities in β-Ag_2S samples with stoichiometric composition and in an equilibrium with metallic silver, in the temperature range 20-150°C. It was shown that the density of pressed β-Ag_2S membranes and its total electroconductivity were related to the pressure, rising asymptotically with it. This indicated one aspect missed in the past, namely, that the electroconductivity of polycrystalline samples of ionic conductors should be studied in relationship to their density. All determinations in this study were made on samples with density of 7.13 g/cm^3. In addition to independent determinations of the conductivity and its components, the transition numbers for ionic and electronic conductivity of β-Ag_2S were tabulated. It was established that ionic conductivity is unrelated to the excess silver in β-Ag_2S. Samples in equilibrium with metallic silver showed conductivity to be 1.5 times higher than samples with stoichiometric composition. Figures 3; references 26: 3 Russian, 23 Western.
[13-7813]

NITROGEN COMPOUNDS

UDC 542.91 : 547.1'118

OXIDES OF DIALKYL(DIARYL)[DIALKYLCARBAMOYLMETHYL]PHOSPHINES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 81 (manuscript received 5 Feb 81) pp 2121-2127

MEDVED', T. Ya., CHMUTOVA, M. K., NESTEROVA, N. P., KOYRO, O. E., KOCHETKOVA, N. Ye., MYASOYEDOV, B. F. and KABACHNIK, M. I., Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The Arbuzov reaction was used to synthesize a series of oxides of dialkyl(diaryl)[dialkylcarbamoylmethyl]phosphines from ethers of trivalent phosphorus and amides of chloroacetic acid. The method can at times be accompanied by a Perkov reaction yielding alpha-aminovinylphosphonates. Chemical properties and infra-red spectroscopy confirmed the derivatives and showed their high stability. The substitution of alkoxyls on the phosphorus atom on alkyl- or aryl-groups significantly increased the extraction capability of the reagent. The most effective substitutes were *p*-phenyl-substituted derivates. Details of the reactions observed are presented in the experimental section. Figures 1; references 12: 6 Russian, 6 English.
[19-12131]

UDC: 542.91 : 541.49 : 547.1'118 : 547.495.2

REACTION OF DICYCLOHEXYLCARBODIIMIDE WITH CARBOXYMETHYLTRIPHENYLPHOSPHONIUM CHLORIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 81 (manuscript received 4 Mar 81) pp 2152-2155

NESMEYANOV, Nik. A., BERMAN, S. T., SHOROKHOV, N. A., PETROVSKIY, P. V. and REUTOV, O. A., Moscow State University imeni M. V. Lomonosov

[Abstract] The reaction of dicyclohexylcarbodiimide with carboxymethyltriphenylphosphonium chloride was shown to produce R'CON(R)CONHR in a 0.3 mole/liter concentration in less than 5 minutes, producing acylcarbamide. The lack of an anhydride of the phosphonium chloride is explained by rapid regrouping of the intermediate product. The speed of regrouping is explained by the presence of

A Cl^- ion. The stable ilide(1,3-dicyclohexylureidocarbonylmethylene)triphenylphosphorane was used to synthesize N-acyl-N,N'-dialkylcarbamide with the bond system C=C-C=O. Details of the procedures are given in the experimental section. References 7: 4 Russian, 3 English.
[19-12131]

UDC 541.6:541.42:541.515:547.1'118

STRUCTURE AND REACTIVITY OF AMINOPHOSPHORANYL RADICALS ORTHOPHENYLENE(ALKYLAMIDO)-PHOSPHITE DERIVATIVES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 17 Jul 80) pp 1014-1019

TUMANSKIY, B. L., KHODAK, A. A., SOLODOVNIKOV, S. P., BUBNOV, N. N., GILYAROV, V. A. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Electron paramagnetic resonance spectra and decay kinetics were studied in aminophosphoranyl radicals which are derivatives of 3,5-ditertiarybutylpyrocatechol with various substituents on the nitrogen atom. The radicals were obtained from the corresponding chlorophosphite amine or hexamethyldisilazane. EPR data indicate that the amino group is equatorial and the dioxy-O-phenylene group apical-equatorial and that tertiarybutyl, tirmethylsilyl and isopropyl substituents result in the formation of two radicals, while ethyl and methyl do not. This may be due to fast pseudorotation in the latter case. At temperatures from -90° to -40° the decay kinetics of the monosubstituted radicals conform to a bimolecular reaction. Decay rate increases with decreasing substituent size. Disubstituted radicals display first order decay with subsequent formation of a ditertiarybutoxy radical. This difference may be the result of the stereoselectivity of alpha cleavage. References 6: 2 Russian, 4 Western.
[117-12126]

UDC 541.6:543.422.25:547.1'118

STRUCTURE AND CONFORMATION OF STEREOISOMERIC 1,5;2,3-BIS-O-(N-DIETHYLAMIDOTHIONOPHOSPHATE)-BETA-D-RIBOFURANOSIDES ON BASIS OF ^{1}H, ^{31}P and ^{13}C NMR DATA

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 10 Jul 80) pp 1036-1045

NABIULLIN, V. N., MUSINA, A. A., CHERNOV, P. P. and MUKMENEV, E. T., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences, Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The stereoisomeric 1,5;2,3-bis-O-(N-diethylamidothionophosphate)-beta-D-ribofurnaosides previously synthesized by the reaction of tris(N-diethylamido)phosphite and sulfur with D-ribose were studied by NMR. PMR and ^{1}H-^{31}P NMR indicate the presence of a seven-membered ring involving the hydroxyls at carbons 1 and 5, which requires that the phosphite have reacted with the beta-D-ribofuranose form of the sugar. A second ring is formed with the 2,3-cis-diol. Calculation of dihedral angles demonstrates that the ribofuranose ring is in the twisted envelope form and that the phosphorus atom is oriented cis to the ribose protons in one isomer and trans in the other, in the five-membered ring. The seven-membered ring appears to be in a chair conformation. The constancy of chemical shifts with changing temperature and solvent polarity confirms the rigidity of conformation demonstrated by molecular models. Using the conformations proposed, the peaks in the ^{13}C-NMR spectra are assigned to the appropriate carbon atoms. Figures 5; references 18: 5 Russian, 1 Czech, 12 Western. [117-12126]

UDC 542.91:547.1'118

REACTION OF PHOSPHOROUS ACID ESTERS WITH ALPHA-FLUOROCARBONYL COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 19 Feb 80) pp 1095-1098

KIBARDIN, A. M., GAZIZOV, T. Kh., GRAYZNOV, P. I. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch USSR Academy of Sciences

[Abstract] The interaction of phosphorous acid esters with hexafluoroacetone and trifluoroacetaldehyde in ether was studied. Using ^{31}P NMR, the product of the reaction of triethylphosphite with hexafluoroacetone was shown to be 1,3,2-dioxaphospholane, formed via a bipolar ionic intermediate with subsequent rearrangement. Trimethylphosphite reacts with trifluoroacetaldehyde to give 2,2,2-trimethoxy-3,5-bis(trifluoromethyl-1,4,2-dioxaphospholane dimethylphosphonate and trimethylphosphate, which were not separated. Heating this mixture at 110° for 5 hours resulted in the conversion of the phospholane to a phosphate. The

dimethylphosphate may be due to isomerization of trimethylphosphate via demethylation of the bipolar ion. The fact that the reaction of a trialkylphosphite with trifluoroacetaldehyde begins with interaction between the phosphorus and carbonyl carbon atoms is confirmed by the production of diethyl-alpha-trimethylsiloxy-beta,-beta,beta-trifluoroethylphosphonate from the reaction of diethyltrimethylsilylphosphite with trifluoroacetaldehyde. After 10 hours at 160° and 200 mm Hg the product phosphonate rearranges to form diethyl-beta, beta-difluorovinylphosphate. The data indicate that the bipolar ion intermediate undergoes the phosphonate-phosphate rearrangement more easily than cleavage and subsequent addition. References 11: 9 Russian, 2 Western.
[117-12126]

UDC 542.91:547.1'118

SYNTHESIS AND CERTAIN PROPERTIES OF 2-SUBSTITUTED, 4,5-BENZO-1,3,2-THIAZAPHOSPHOLANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 10 Jul 80) pp 1108-1113

PUDOVIK, M. A., MIKHAYLOV, Yu. B. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The effect of replacing the endocyclic oxygen atom in 4,5-benzo-1,3,2oxazaphospholanes with sulfur was investigated. The thiazaphospholanes were synthesized from O-aminothiophenol and tetraethylamides of methyl-, ethyl- or phenylphosphorous acids. These phospholanes were more stable than their oxygen analogues, forming the spirophosphorane dimer after prolonged standing or catalysis with $AlCl_3$ and alkyldichlorophosphines. The increased stability is due to the greater electron-accepting action of sulfur, as compared to oxygen, and the decreased thermodynamic advantage of a pentacovalent structure containing sulfur. The reaction of N-methyl-ortho-aminothiophenol with the phosphorous acid amides leads mainly to a linear product, even after heating. This indicates that the N-methyl group hinders intramolecular transamidation. Acid catalysis or addition of sulfur and heat promote cyclization. N-methyl-O-aminothiophenol reacts with dimethylsilysdichloride to give a cyclic product, which can be reacted with phenylphorphorous dichloride, replacing the dimethylsilyl group with dibenzoyl to give one of the few spirophosphoranes containing a phosphorus-sulfur bond. A series of 2-alkoxy derivatives was obtained from alkylphosphorous acid tetraethyldiamides and O-aminothiophenol or N-methyl-O-aminothiophenol. They add sulfur exothermally and are easily oxidized by dimethyl sulfoxide in chloroform with the addition of iodine. A thione-thiol rearrangement was observed in one case. References 7: 3 Russian, 4 Western.
[117-12126]

UDC 542.91:547.1'118

INTERACTION OF 2-PHENYL(ACETYL)-5-METHYLDIAZAPHOSPHOLS WITH DIAZOMETHANE AND DIAZOFLUORENE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 12 May 80) pp 1113-1116

ARBUZOV, B. A., DIANOVA, E. N. and SHARIPOVA, S. M., Chemical Institute imeni A. M. Butlerov, Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The reaction of 2-phenyl-5-methyldiazaphosphol with diazomethane results in the evolution of nitrogen and a 1:1 adduct trimer, which NMR and UV data indicate involves a six-membered ring with three phosphorus and three carbon atoms. 2-Acetyl-5-methyldiazaphosphol reacts with diazofluorene in hexane or pentane to give 2-acetyl-4-methyl-8-fluorenyl-1-phospho-2,3,6,7-tetrazobicyclo[3,3,0]-octadiene-3,6. This suggests that cycloaddition to the phosphorus-carbon double bond proceeds via 1,3-dipolar cycloaddition rather than a carbene mechanism. In the more polar solvents carbon tetrachloride, methylene chloride and benzene, a diilide structure is formed, which converts rapidly to a trimer. The pyrazole produces the same trimer on heating. On reacting 9-diazofluorene with 2-phenyl-5-methyldiazaphosphol, depending on the nature of the solvent and temperature, either a 1:1 trimer adduct or a mixture of trimer with the corresponding pyrazole derivative formed. Figures 1; references 4: 3 Russian, 1 Western.
[117-12126]

UDC 542.91:541.1'118

REACTION OF DICHLOROTHIOPHOSPHORYLPHOSPHORIMIDE TRICHLORIDE WITH NUCLEOPHILIC REAGENTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 3 Jul 80) pp 1117-1124

KHODAK, A. A., GILYAROV, V. A. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The reaction of dichlorothiophosphorylphosphorimide trichloride $Cl_3P=NP(S)Cl_2$, a valuable intermediate in the synthesis of physiologically active compounds, with alcohols, phenols and secondary amines was studied by ^{31}P-NMR, PMR and IR. To facilitate this, the phosphorimides with phenoxy or dimethylamine groups in place of chlorine were synthesized and studied. The chloride was found to react readily with alcohols, forming an unstable monoalkoxy derivative which isomerizes on distillation to a thiol. With phenols the chloride forms stable monophenoxy products at 140-150° and diphenoxy products at 150-160°, while the triphenoxy product formed at 170-180° undergoes significant decomposition, unless pyridine hydrochloride is added. At 225-240° all chlorine atoms are

replaced with phenoxy groups; however the yield is low. The second and third phenoxy go on the imide phosphorus atom. With a twofold excess of trimethylamine the chloride forms a monosubstitution product at the imide phosphorus. With a fourfold excess both disubstitution on the imide and one substituent on each phosphorus are seen, in a ratio of 3:1. The trisubstituted product obtained with a six-fold excess of amine has two substituents on the imide phosphorus. With an eightfold excess two chlorines on each phosphorus are replaced. Complete replacement of all chlorine atoms requires 24-48 hours of further reaction at 20°. The data indicate that the introduction of a dimethylamide group reduces the reactivity of the chlorine atoms in the starting material. The mono-diethylamido derivative was produced with diethylamine or diethylamidotrimethylsilane. References 8: 4 Russian, 4 Western.
[117-12126]

UDC 542.91:541.1'128'118:547.56:547.262

INTERACTION OF 2-TRIMETHYLSILOXY-1,3,2-OXAZAPHOSPHOLANES WITH PHENOL AND ETHANOL

Moscow IZVESTIYA AKADEMII NAUL SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 20 Jun 80) pp 1133-1134

KIBARDINA, L. K., PUDOVIK, M. A. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The reaction of 2-trimethylsiloxy-3-phenyl-1,3,2-oxazaphospholane with phenol in a 1:1 ratio leads to a complex mixture of products, including O-phenyl-O-(beta-phenylamino)ethyltrimethylsilylphosphite and 2-oxo-2-hydro-3-phenyl-1,3,2-oxazaphospholane. Further addition of a second mole equivalent of phenol results in complete conversion to the alkylarylphosphorous acid. The data indicate that desilylization and cleavage of the phosphorus-nitrogen bond both occur in the reaction mixture, with the former predominating. The reaction of the phospholane with p-methoxyphenol proceeds similarly. 2-Trimethylsiloxy-3-methyl-1,3,2-oxazaphospholane reacts with phenol and 2-trimethylsiloxy-3-phenyl-1,3,2-oxazaphospholane reacts with ethanol, both at 1:2 ratios, to give analogous acid phosphites. References 3: 2 Russian, 1 Western.
[117-12126]

UDC 541.22:546.11:541.515:543.422.27

NONEQUIVALENCE OF BETA HYDROGENS IN NITROXIDE RADICALS $(Me_2N)_2P(O)N(Me)CH_2N(O)R$

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 31 Jul 80) pp 1134-1137

GASANOV, R. G., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The first example of beta-hydrogen nonequivalence in nitroxide radicals which is not connected with the presence of a chiral center is reported. When R is $-CMe_3$ the beta-hydrogens are equivalent in the EPR spectrum. However, if R is $2,3,5,6-Me_4C_6H-$ EPR indicates nonequivalence. This is due to steric hindrance of free rotation in the R_2CH_2- group and around the carbon-nitrogen bond. Nonequivalence in the $-CMe_3$ radical is observed at -20°; the $2,3,5,6-Me_4C_6H-$ radical showed line broadening but no equivalence even at 100°. The radicals are formed photochemically from t-butylperoxide and hexamethylphosphoramide in the presence of 2-methyl-2-nitrosopropane or nitrosodurol. The data permit the calculation of dihedral angles. Figures 2; references 10: 2 Russian, 8 Western.
[117-12126]

UDC 542.91:547.1'118

REACTION OF DIPHENYLAMIDOPHOSPHATE WITH PHOSPHORUS PENTACHLORIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 31 Jul 80) pp 1137-1139

KHODAK, A. A., GILYAROV, V. A. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The possibility of isomeric product formation from the reaction of diphenylaminophosphate with phosphorus pentachloride was studied. The product was found to be identical to that of the reaction of $Cl_3P{=}NP(O)Cl_2$ with phenol, as identified by refractive index, density and ^{31}P-NMR. Hydrolysis products were also the same. When the product was reacted with dimethylamine diphenyldimethylamido(tetramethyldiamidoimido)phosphate was obtained. The data indicate that diphenylamidophosphate gives the isomerized product on reaction with phosphorus pentachloride. References 7 (Russian).

UDC 542.91:547.1'27

SYNTHESIS AND SOME TRANSFORMATIONS OF 1- AND 9-o- AND m-CARBORANYLDICHLOROARSINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 6 Aug 80) pp 1280-1288

ZAKHARKIN, L. I. and PISAREVA, I. V., Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] 1-o- and m-Carboranyldichloroarsines were produced by the reaction of lithium carboranes with dialkylaminoarsine chlorides and 9-o- and m-carboranyldichloroarsines through reaction of bicarboranyl mercury with $AsCl_3$. Hydrolysis and chlorination of 1- and 9-o- and m-carboranyldichloroarsines were investigated; it was established that arsine oxides form upon hydrolysis of 1-o- and m-carboranyldichloroarsines. Hydrolysis of 9-o- and m-carboranyldichloroarsines proceeds to carboranyl arsinic acid, an oxide or oligomer products with different chlorine content. Carborane derivatives containing a pentavalent arsenic atom were produced. Light chlorolysis of C-As and B-As bonds in carboranyl derivatives of arsenic result from chlorination of 1- and 9-o- and m-carboranyldichloroarsines in an anhydrous medium. The B-As bond is not split upon reduction of 9-o- and m-carboranyl arsinic acids containing this bond by sulphur anhydride in hydrochloric acid. Figures 1; references 10: 5 Russian, 5 Western.
[123-6521]

UDC 541.11+547.242

THERMOCHEMICAL INVESTIGATION OF COORDINATION CAPABILITY OF SOME ORGANIC ARSENIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 22 Sep 80) pp 1376-1379

TSVETKOV, V. G., PEROV, V. A., GATILOV, Yu. F. and ALEKSANDROV, Yu. A., Gor'kiy State University imeni N. I. Lobachevskiy, Gor'kiy Agricultural Institute and Scientific Research Institute of Chemistry attached to the Gor'kiy State University imeni N. I. Lobachevskiy

[Abstract] The electron donor-acceptor properties of tertiary arsines, mono- and dihalogen arsines, sulphides of tertiary arsines and esters of thioarsinic acids were studied by the thermochemical method upon mixing with some organic compounds and tributyl stannous chloride and also mixing of phenol with organic solvents. The acceptor capability of trivalent compounds of arsenic during sequential substitution of halogen atoms for hydrocarbon radicals decreases toward $AsHlg_3 > RAsHlg_2 > R_2AsHlg > R_3As$. The values of $DN(SbCl_5)$ were estimated for methyl and ethyl derivatives of elements of groups V-VI and were compared to values found on the basis of the enthalpy of mixing phenol in the ratio of 1:1 with nitromethane, nitrobenzene, benzonitryl, acetonitryl, propionitrile, tributylphosphate, N,N-dimethylacetamide, dimethylsulfoxide and pyridine at 320 K. Organic arsenic compounds can manifest electron donor and electron acceptor properties as a function of the chemical nature of the components. Figures 1; references 27: 22 Russian, 5 Western.
[123-6521]

UDC 541.127:542.938:547.1'118

KINETICS OF ALKALINE HYDROLYSIS OF PHENYL ESTERS OF DIMETHYLTHIONPHOSPHINIC ACID IN WATER-DIOXANE MIXTURES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 81 (manuscript received 29 Sep 80) pp 1264-1267

ZHDANKOVICH, Ye. L., ISTOMIN, B. P. and VORONKOV, M. G., Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] The kinetics of alkaline hydrolysis of a number of p-substituted esters of $Me_2P(S)OC_6H_4X$-p was studied at 25° in water-dioxane mixtures and the measurements were made spectrometrically with a surplus of NaOH. A great similarity of the effect of the structure of the aroxyl departing group in the composition of the water-dioxane mixture on the process of alkaline hydrolysis of organophosphorus esters and acetates is indicated. The structure of the aroxyl departing group and the composition of the medium affect the rate constant of hydrolysis. There is a significant nonadditive effect of the structure of the aroxyl departing group and the composition of the medium in the given reaction series. Alkaline hydrolysis of organophosphorus esters takes place by a reduction-splitting mechanism with the ester molecule being attacked by the HO^- anion in the limiting stage. Figures 2; references 10: 8 Russian, 2 Western.
[122-6521]

UDC 541.63:547.1'118

CONFORMATIONAL ANALYSIS OF DIMETHYL(BROMOMETHYL)- AND DIMETHYL(IODOMETHYL)PHOSPHINIC OXIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 81 (manuscript received 18 Aug 80) pp 1292-1296

RAYEVSKIY, O. A., MUMZHIYEVA, N. G., KRON, T. Ye. and TSVETKOV, Ye. N., Institute of Physiology of Active Substances, USSR Academy of Sciences, Chernogolovka, and Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Dimethyl(bromethyl)phosphine $(CH_3)_2P(O)CH_2Br$ and dimethyl(iodomethyl)phosphine $(CH_3)_2P(O)CH_2I$ oxides were investigated conformationally on the basis of data from vibrational spectra, dipole moments and Kerr constants. The frequencies and relative intensities of the absorption bands showed different values in the infrared spectrum and of the line in vibrational spectra in the range of 400-1,600 cm^{-1}. Pair conformational equilibria are typical for dimethyl(bromomethyl)- and dimethyl(iodomethyl)phosphine oxides. Structures with transorientation of the phosphoryl and carbon-halogen bonds predominate in the nonpolar medium. References 12: 6 Russian, 6 Western.
[122-6521]

UDC 541.128 :541.515 : 547.1'118

ACID AND ALKALINE CATALYSIS IN EXCHANGE REACTIONS OF PHOSPHOROUS ACID THIOETHERS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 81 (manuscript received 18 Dec 80) pp 2133-2134

SINYASHIN, O. G., BATYYEVA, E. S., PUDOVIK, A. N. and OFITSEROV, Ye. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The effects of various catalysts on the reaction rate in a number of phosphorous thioethers were studied using ^{31}P nuclear magnetic resonance of the reactions of trimethyl- and triethylthiophosphates in the presence of $Et_3N\cdot HCl$, CH_3COOH, CH_3SNa, EtSNa, and EtONa. Trimethyltrithiophosphite reacted with EtSNa to produce a balanced mixture of 4 thiophosphites, while triethyltrithiophosphite reacted with EtONa to give only triethylphosphite and EtSNa. The lack of mixed thiophosphites appeared to be related to lack of a back reaction of triethylphosphite with EtSNa, even at temperatures of 100-120°C. Results indicated that exchange of thioalkyl radicals in a number of trialkyltrithiophosphites are catalyzed by both acids and bases, with the rate of exchange increasing with the transition from acid to alkaline catalysts. Figures 1; references 4: 3 Russian, 1 English.
[19-12131]

UDC 541.62 : 541.13 : 547.1'118

ISOMER COMPOSITION OF ELECTROCHEMICALLY SYNTHESIZED ALKYLPHENYLPHOSPHONATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 81 (manuscript received 29 May 81) p 2170

NIKITIN, Ye. V., ROMAKHIN, A. S., PARAKIN, O. V., ROMANOV, G. V., KARGIN, Yu. M. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences; and Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The authors discovered an unusually high incidence of meta-displacement in the electrophile reaction of electrochemical phosphorylation of alkylbezenes using trialkylphosphites. Apparently due to the close chemical shifts of the methyl groups of the phenyl ring, the meta- and para-isomers are spectrographically indistinguishable. References 2: 1 Russian, 1 English.
[19-12131]

UDC 542.91:547.1'118

REACTION OF MONOTHIOPHOSPHORIC ACIDS WITH OXETANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 19 May 80) pp 1128-1130

NURETDINOVA, O. N. and ARBUZOV, B. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The reaction of oxetanes with cyclic and acyclic monothiophosphoric acids was studied. Dialkyl esters of thiophosphoric acid were found to react with oxetanes to form S-3-oxyalkyl esters of dialkylthiophosphoric acid. The cyclic thiophosphoric acids with six or seven membered rings reacted analogously. These conclusions were confirmed by IR and ^{31}P-NMR. The acyclic esters were stable to storage, heat and vacuum distillation, while the six-membered ring esters decomposed on distillation at 160-180°, giving predominantly 3-mercaptoalkyl compounds, which result from intramolecular rearrangement. The five-membered cyclic thiophosphoric esters gave the rearrangement product immediately on reaction with oxetanes. The S-3-oxybutyl ester reacts with phosphorus pentachloride or thionyl chloride, as a result of which the hydroxyl is replaced with chlorine. References 7: 5 Russian, 1 Western.
[117-12126]

UDC 542.952.1:547.1'118

REARRANGEMENT OF 2-OXYALKYL ESTERS OF DIPHENYLTHIO- AND SELENOPHOSPHORIC ACID

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 19 May 80) pp 1130-1132

NURETDINOVA, O. N. and ARBUZOV, B. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] In contrast to di-t-butylthiophosphoric acids, S-2-oxyalkyl esters of diphenylthiophosphoric acid isomerize to form a thiaoxaphospholane ring. The evidence for this is in the ^{31}P-NMR spectrum of the product of the reaction of oxirane and diphenylthiophosphoric acid. The phospholanes are not stable to hydrolysis or alcohol. Similar structures were obtained via vacuum distillation of S-2-oxyalkyl esters of dialkylthiophosphoric acid. Ethylphenyl or isopropylphenyl esters react with oxiranes to give the 2-mercaptoalkyl ester, which forms thiaoxaphospholane on distillation. Oxiranes and diphenylselenophosphoric acids form the analogous selenaoxaphospholane, which is only stable in ether or benzene and decomposes on solvent removal with the production of elemental selenium. References 4: 3 Russian, 1 Western.
[117-12126]

UDC 542.91:541.6:547.1'118

SYNTHESIS AND STRUCTURE OF DIPHOSPHOLENEBUTADIENES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 12 Sep 80) pp 1144-1146

ARBUZOV, B. A., PUDOVIK, A. N., VIZEL', A. O., SHCHUKINA, L. I., MUSLINKIN, A. A., PARAMONOVA, V. I., KHARITONOV, V. V., KRUPNOV, V. K. and VAKULENKO, O. V., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] As part of the planned production of phospholene-containing polymers to sorb heavy metals, the synthesis of the phospholene-containing diene monomer from 1-halophospholenes and 1,4-dihydroxy-butyne in the presence of triethylamine was conducted. When the reaction is carried out in tetrahydrofuran the product precipitates together with triethylamine hydrochloride. A study of comparative solubilities in nine solvents indicated that toluene is the most suitable solvent for obtaining the pure product. Analysis of the IR and NMR spectra of the purified products confirms the presence of the 2,3-diphospholenebuta-1,3-diene. References 15: 10 Russian, 5 Western.
[117-12126]

UDC 541.63:542.91:547.1'118

STEREOSELECTIVITY IN SERIES OF O,O-BIS(ALPHA-POLYFLUOROALKYLBENZYL)METHYLPHOSPHONATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 22 Jan 81) p 1182

KABACHNIK, M. I., ZAKHAROV, L. S., GORYUNOV, Ye. I., PETROVSKIY, P. V., SVOREN', V. A. and SHCHERBINA, T. M., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The relative amounts of the three diastereomers of the O,O-bis(alpha-polyfluoroalkylbenzyl)methylphosphonates produced by the reaction of alpha-polyfluoroalkylbenzyl alcohols with methyl dichlorophosphonate were determined. The content of the two meso forms was approximately equal to that of the racemic form and the ratio of meso forms corresponded to that in the intermediate monochlorophosphonate. The data indicate that the first stage of the reaction is stereoselective, while the second stage is not. References 6: 2 Russian, 4 Western.
[117-12126]

UDC 543.422:547.1'118

VIBRATIONAL SPECTRA AND CONFORMATION OF 2-METHYL-2-SELENO-1,3,2-DIOXAPHOSPHORINANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 81 (manuscript received 4 Oct 80) pp 1156-1158

SHAGIDULLIN, R. R., SHAKIROV, I. Kh., MUSYAKAYEVA, R. Kh., VANDYUKOVA, I. I. and NURETDINOV, I. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Raman and IR spectra of 2-seleno-2-methyl-1,3,2-dioxaphosphorinane and 2-seleno-2-methyl-5,5-dimethyl-1,3,2-dioxaphosphorinane were obtained over a wide temperature range for various states of aggregation, as well as in solvents of varying polarities. Splitting of several peaks on the transition from crystal to melt and the appearance of new peaks on increasing the temperature of the melt were seen. The secondary absorbance bands were more intense in more polar solvents. The data and model compound calculations indicate that in the crystalline state the phosphorus-selenium double bond is in the axial position. The equitorial form appears in the melt and is stabilized by more polar solvents. All of the Raman lines in the skeletal valence vibration area exhibit some depolarization, indicating that in the liquid state, or on solvation, the compounds exist as a distorted chair. References 5: 4 Russian, 1 Western.
[117-12126]

UDC 546.18 + 547.315.2

SYNTHESIS OF QUATERNARY PHOSPHONIUM SALTS AND ESTERS OF PHOSPHONIC ACID WITH CONJUGATED DIENE GROUPING

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 34, No 7, Jul 81 (manuscript received 11 Sep 80) pp 563-568

LULUKYAN, R. K., OVAKIMYAN, M. Zh. and INDZHIKYAN, M. G., Institute of Organic Chemistry, ArSSR Academy of Sciences, Yerevan

[Abstract] The reaction of tertiary phosphines and triethylphosphite with 1,4-dibromo-2-methyl-2-butene (I) was investigated. It was shown that this reaction leads to the formation of diphosphonium salts with an α,β-double bond position in respect to the P atoms. When 1,4-dibromo-2-butene and 1,4-dibromo-2-methyl-2-butene were reacted with triethylphosphites, the products were the esters of corresponding phosphonic acids, which could be easily converted to 1,3-dienephosphonates, interesting as antipyretic additives. The reaction of triphenyl- and tributylphosphines with 1,4-dibromo- and 4-bromo-1-acetoxy-1,2-butadienes gave 4-bromo- and 4-acetoxy-1,3-butadienylphosphonium bromide; with 1-chloro-2,3-butadiene, 1,3-butadienylphosphonium chlorides were obtained. References 5 (Russian).
[09-7813]

UDC 546.185.325+661.185.224+543.257.1

ACID-BASE PROPERTIES OF SOME PHOSPHORUS-CONTAINING COMPOUNDS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 5, May 81 (manuscript received 10 Dec 79) pp 556-560

POTAPOV, A. S. and UDALOVA, T. A., Ivanovo Chemical Engineering Institute

[Abstract] The acid-base properties of some phosphorus-containing compounds were studied in aqueous and anhydrous medium using the potentiometric method. Phosphoric acids, salts and esters of orthophosphoric acid and mixtures of phosphoric acid and metal phosphates and tertiary amines were the objects of investigation. Introduction of various types of weak acid, neutral and base additives have a different effect on variation of the acid functions of phosphoric acids. Introduction of organic bases causes no intensification of the acidity of phosphoric acid solutions. Introduction of carbamide to orthophosphoric acid solutions increases the acid ionization both in aqueous and anhydrous solvents. The ion force of dibasic acids decreases in the order maleic acid, phthalic acid, fumaric acid, succinic acid for the compounds studied. The total basicity of aqueous solution of phthalic acid increases upon introduction of orthophosphoric acid to these solutions and solutions of other dibasic acids. References 5: 4 Russian, 1 Western.
[119-6521]

UDC 547.241+547.242

SYNTHESIS AND STUDY OF PHENOXYCYCLOTRIPHOSPHAZINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 24 Jul 80) pp 1221-1226

SULKOVSKI, V., VOLODIN, A. A., BRANDT, K., KIREYEV, V. V. and KORSHAK, V. V., Institute of Polymers, Polish Peoples Republic, Academy of Sciences, Zabsze, Institute of Elementary Organic Compounds, USSR Academy of Sciences, and Moscow Chemical Engineering Institute imeni D. I. Mendeleyev

[Abstract] The reaction of hexachlorotriphosphazine with sodium and potassium phenolates was studied comparatively under different conditions and some properties of phenoxychlorocyclotriphosphazines were also studied. A degree of substitution more than three was achieved in phenoxylation of a phenol and alkali mixture during production of phenoxychlorocyclotriphosphazines. The nuclear magnetic resonance spectra of the compounds were taken and the results were subjected to mass spectral analysis to determine fragmentation of the compounds. References 13: 5 Russian, 8 Western.
[123-6521]

UDC 547.341

SYNTHESIS AND CHEMICAL TRANSFORMATIONS OF DICHLOROANHYDRIDE OF 2-CHLORO-2-(1-CYCLOHEXANYL)-ETHENEPHOSPHONIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 29 Dec 79) pp 1230-1235

ANGELOV, Kh. M., KHRISTOV, V. Kh. and IONIN, B. I., Peoples Republic of Bulgaria, Higher Pedagogical Institute, Shumen and Leningrad Engineering Institute imeni Lensovet

[Abstract] Chlorination of dichloroanhydride of dicyclohexylidene ethenephosphonic acid to form dichloroanhydride of 2-chloro-2-(1-cyclohexanyl) ethenephosphonic acid was studied with respect to synthesis of 1,3-diene phosphonates. Interaction with sulphuryl chloride produces a cyclic chloride of spiran structure. Dichloroanhydride with unified structure and dialkyl esters of 2-chloro-2-(1-cyclohexanyl) ethenephosphonic acid were synthesized upon reaction with dichloroanhydride of 2-chloro-2-(1-cyclohexanyl) ethenephosphonic acid. Ethenephosphonic acid was produced upon hydrolysis of the dichloroanhydride. Figures 1; references 7 (Russian).
[123-6521]

UDC 547.245

SPLITTING CYCLOSILOXANES BY CHLOROSILANES IN PRESENCE OF PHOSPHORIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 7 Jul 80) pp 1342-1346

YUZHELEVSKIY, Yu. A., SVIRIDOVA, N. G., KARPOV, G. I. and MARKOSOVA, A. V.,
All-Union Scientific Research Institute of Synthetic Rubber
imeni Academician S. V. Lebedev

[Abstract] The interaction of cyclosiloxanes D_3, D_4, D_5, AD_2 and F_3 [D = $(CH_3)_2SiO$, A = $CH_3(C_6H_5)SiO$ and F = $CH_3(CH_2CH_2F_3)SiO$] with chlorosilanes $(CH_3)_nSiCl_{4-n}$(n = 0-3) was investigated in the presence of catalytic quantities of phosphoric acid. Up to 50-60 percent of the reaction conversion is first order for both cyclosiloxane and chlorosilane. An increase of catalyst concentration and a decrease of the number of siloxane links in cyclosiloxanes causes the rate of reaction to increase. Electron acceptor groups with silicon atoms are replaced by electron donor groups. The kinetics of the process determine the rates of reactions and the induction period is determined by the rate of reaction of H_3PO_4 with chlorosilane. Active cyclosiloxane splitting centers are phosphorosiloxane complexes with hydrogen chloride formed upon interaction of chlorosilanes with H_3PO_4. Figures 6; references 4: 3 Russian, 1 Western.
[123-6521]

UDC 547.242.66

HOMOLYTIC ADDITION OF DIALKYLPHOSPHITES TO 1,4-DIMETHOXY-2-BUTINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 24 Nov 80) pp 1430-1431

BREL', A. K., RAKHIMOV, A. I. and FILIMONOVA, L. M., Volgograd Polytechnical Institute

[Abstract] The interaction of dialkylphosphites with 1,4-dimethoxy-2-butine in the presence of organic peroxides was studied and the reaction produced 1,4-dimethoxy-2-butene-2-dialkylphosphonates with a yield of approximately 50 percent. The resulting addition product is a mixture of two isomers wherein the isomer content is 80 and 20 percent. The compounds were purified of dialkylphosphite traces by double distillation over $NaHCO_3$. References: 3 Russian.
[123-6521]

UDC 547.419

NEW METHOD OF SYNTEHSIZING PHOSPHORYLATED FORMALS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 4 Nov 80) pp 1432-1433

MALENKO, D. M. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] A general method was developed for producing phosphorylated formals based on interaction of esters of trivalent phosphoric acid and diethoxymethylacetate. Whereas phosphorylated ethylacetate reacts by interaction of acid esters of trivalent phosphorus and diethoxymethylacetate, forming phosphonate, a more acid phosphorylated malonic ester reacts with ilide and acetic acid formation. The phosphonite interacts with acetic acid or acetamide and forms a corresponding mixed anhydride or amide. References 4: 3 Russian, 1 Western.
[123-6521]

UDC 547.241

REGROUPING OF THIONPHOSPHAZO COMPOUNDS WITH P-P BOND TO AMIDOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 4 Nov 80) pp 1433-1434

GOLOLOBOV, Yu. G., SUVALOVA, Ye. A. and CHUDAKOVA, T. I., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] Previously unknown thionphosphazo compounds were produced upon imination of monothiooxides of tetraalkoxydiphosphines by phenylazide. A summarization of the phosphazo compounds to isomeric amides results upon distillation in a high vacuum. The thion amides produced by thermolysis of phosphazo compounds and from amides are identical according to infrared and nuclear magnetic resonance spectroscopy and thin-layer chromatography. The thion amides are capable of entering further transformations with the phosphorus atom. References 4: 3 Russian, 1 Western.
[123-6521]

UDC 547.558:543.422,2+539.26

5-ETHYL-10-PHENYL-10-THIONO-5,10-DIHYDROPHENOPHOSPHAZINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 24 Nov 80) pp 1434-1435

BOKANOV, A. I., GUSEV, A. I., DEMIDOVA, N. I., LOS', M. G., SEGEL'MAN, I. R. and STEPANOV, B. I., Moscow Chemical Engineering Institute imeni D. I. Mendeleyev

[Abstract] The compound 5-ethyl-10-phenyl-10-thiono-5,10-dihydrophenophosphazine was synthesized, its X-ray structure was investigated, the stereochemistry of a molecule of the compound was compared to that of molecules of compounds studied earlier. The molecules of the three compounds are described. References 2 (Russian).
[123-6521]

UDC 547.26'118+547.722.3

CYCLIC PHOSPHORUS-CONTAINING ACETALS, DERIVATIVES OF TETRAHYDROFURAN

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 6, Jun 81
(manuscript received 10 Nov 80) pp 1435-1436

GAZIZOV, M. B., KRASIL'NIKOVA, Ye. A. and GALIULLINA, I. I., Kazan' Chemical Engineering Institute imeni S. M. Kirov

[Abstract] A method was found for producing previously unknown cyclic acetals, derivatives of tetrahydrofuran, with phosphoric function in an alcohol fragment by interaction of 2,3-dihydrofuran and α-oxyalkylphosphonates in the presence of catalytic quantities of concentrated hydrochloric acid. The properties of the resulting compounds are given. Infrared and nuclear magnetic resonance spectra and complete elementary analysis show the structure and composition of acetyls.
[123-6521]

UDC: 547.341

SYNTHESIS AND STRUCTURE OF DERIVATIVES OF 3,4-DICHLORO-1, 3-BUTADIENE-2-PHOSPHONIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 10 Jul 80) pp 1703-1710

LYKOV, A. D., MASHLYAKOVSKIY, L. N., VAFINA, G. S. and IONIN, B. I.,
Leningrad Institute of Technology imeni Lensovet

[Abstract] Data are presented on the structure of 3,4-dichloro-1, 3-butadiene-2-phosphonic acid esters obtained from the dichloroanhydride. The purity and structure of the compounds were confirmed by elemental analysis, IR, PMR and NMR ^{13}C spectroscopy and TLC. The results of spectroscopy indicate that the process of dehydrochlorination of the dichloroanhydride leads exclusively to a single isomer, with transconfiguration. PMR spectroscopy using lanthanide reagents in combination with dipole moment analysis yields an estimate of the conformational composition of the compounds, in which transoid structure of the diene system predominates. Figures 3; references 8: 7 Russian, 1 Western.
[4-6508]

UDC: 541.49:546.882

SYNTHESIS AND REACTIONS OF BIS(DIPHENYLPHOSPHIDO) AND BIS(TRIPHENYLSILYL) NIOBOCENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 15 Dec 80) pp 1723-1726

OL'DEKOP, Yu. A. and KNIZHNIKOV, V. A., Instiuute of Physical and Organic Chemistry, Belorussian Academy of Sciences

[Abstract] Compounds in which niobium atoms are bonded with diphenylphosphide or triphenylsilyl radicals are described. The compounds were synthesized by the interaction of dicyclopentadienylniobium dichloride with lithium diphenylphosphide and triphenylsilyl lithium. It was found that both of the organic compounds of lithium react with niobocene dichloride in tetrahydrofuran with a ratio of the reagents $(C_5H_5)_2NbCl_2$:RLi close to 1:2.5. The initial compound disappears rapidly and the reaction solutions are intensively colored (dark green for lithium diphenylphosphide, violet for triphenylsilyl lithium). The organic compounds of niobium formed are paramagnetic, sensitive to molecular oxygen. Their extreme oxygen sensitivity makes physical and chemical studies of these compounds quite difficult; however, it was established that the addition of ferricinium leads to stable derivatives of pentavalent niobium. An excess of iodine acts on the compounds to split the niobium-phosphorus and niobium-silicon bonds. References 4 (Russian).
[4-6508]

UDC: 546.18

INTERACTION OF IMIDOPHOSPHENOUS ACID AMIDES WITH COMPOUNDS CONTAINING MOBILE PROTON: I. PHOSPHORUS-NITROGEN DIAD PROTOTROPIC TAUTOMERY IN SERIES OF PRODUCTS OF ATTACHMENT OF ALCOHOLS, THIOLS AND AMINES TO IMIDOPHOSPHENOUS ACID AMIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 25 Nov 80) pp 1726-1743

ROMANENKO, V. D., RUBAN, A. V., KALIBABCHUK, N. N., IKSANOVA, S. V. and MARKOVSKIY, L. N., Institute of Organic Chemistry, Ukrainian Academy of Sciences

[Abstract] A detailed study is presented of the reaction of imidophosphenous acid amides with three types of compounds having a mobile proton--alcohols, thiols and amines; the structures of the substances obtained, involving a broad range of change of the electronic and spatial nature of the organic radical, were studied. In each of the series of proton donor nucleophilic reagents studied, the rate of attachment to the imidophosphenous acid amides increases with increasing nucleophilicity of R^2XH and a decrease in spatial screening of the nucleophilic center. The existence of amide-PH-imide tautomery is proven in a number of products of attachment. NMR spectra are used to determine the ratio of the tautomer forms as a function of the temperature and solvent used in synthesis. The influence of steric factors in the thermodynamic stability of the tautomer forms is studied. Figures 4; references 23: 6 Russian, 17 Western.
[4-6508]

UDC: 542,92:547.1'118

THERMOLYSIS OF PHOSPHONOUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 9 Oct 80) pp 1743-1747

ANDREYEV, N. A. and GRISHINA, O. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] A study is made of thermal decomposition of cyclohexyl phosphonous acid. Differential thermal analysis of the thermolysis of this stable compound indicated an initial decomposition temperature of 230°C. The maximum exo-effect on the DTA curve is observed at 250°C. The mechanism of disproportionation of phosphonous acids is not known. The first event is probably splitting of water from cyclohexyl phosphonous acid upon heating, either intramolecularly or intermolecularly, forming cyclohexyl polyphosphonite or pyrocyclohexyl phosphonous aicd. Cyclohexyl phosphonous acid and cyclohexyl polyphosphonate were detected by NMR studies. Cyclohexyl cyclopolyphosphine was not detected, apparently a result of its ability to react with the initial acid present in solution to form cyclohexyl phosphine and cyclohexyl polyphosphonate. The intermediate stage in the thermolysis of phosphonous acids is formation of anhydrides

which are disproportionated to phosphonic acids, cyclopolyphosphines and polyphosphonates. Figures 1; references 10: 4 Russian, 6 Western.
[4-6508]

UDC: 547.341

MECHANISM OF PHOSPHORYLATION OF PENTACHLORITE ALKENES BY PHOSPHORUS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81 (manuscript received 13 Jan 81) pp 1747-1756

ROZINOV, V. G., RYBKINA, V. V., KOLBINA, V. Ye., GLUKHIKH, V. I., DONSKIKH, V. I. and SEREDKINA, S. G., Irkutsk State University imeni A. A. Zhdanov, Institute of Petrochemical and Coke Chemical Synthesis of Irkutsk State University

[Abstract] An attempt was made to synthesize $RR'CClCH_2PCl^{+}_{3}PCl^{-}_{6}$, an intermediate in a possible mechanism of synthesis of unsaturated organophosphorous compounds. It was found that the compounds $RPCl_2$, where R=PhCH=CH, easily react with a solution of phosphorus pentachloride in benzene at room temperature in a ratio of 1:2. Alkenyl dichlorophosphines under mild conditions are thus easily converted to the corresponding organyltrichlorophosphonium hexachlorophosphates by PCl_5. It was hoped that by the action of phosphorus pentachloride on these compounds the end product could be produced under mild conditions. The products of the conversion of the complex were found to contain exclusively organophosphorus saturated compounds. The experiments thus indicate that the product is unstable at room temperature. Figures 4; references 13: 12 Russian, 1 Western.
[4-6508]

UDC: 543.42:547.1.118

IONIZATION POTENTIALS OF ELECTRON AND SPATIAL STRUCTURE OF TRIVALENT PHOSPHOROUS ACID DIESTERS AND TRIESTERS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81 (manuscript received 2 Jul 80) pp 1757-1766

ARSHINOVA, R. P., ZVEREV, V. V., VILLEM, Ya. Ya. and VILLEM, N. V., Chemical Scientific Research Institute imeni A. M. Butlerov of the Kazan' State University imeni V. I. Ul'yanov-Lenin, Institute of Organic and Physical Chemistry, Kazan' Branch, USSR Academy of Sciences

[Abstract] A detailed study was performed of the photoelectron spectra of a number of diesters and triesters of the acids of trivalent phosphorus. The interpretation of the ionization potentials utilized the approximation of the theorem of Kupmans, according to which the values of the ionization potentials are equal to the orbital energies, based on comparison of the potentials of

related structures. The data presented indicate a decrease in the interaction between undivided electron pairs in bicyclic systems. With a transition from acyclic compounds to cyclic and bicyclic compounds in the trialkylphosphites, structures with T orientation relative to the P-O bond accumulate. Analysis of the deeper bands in the spectra of the trialkylphosphites reveals slight changes, within the limits of experimental error. This indicates that n_O-n_O interactions are less sensitive to conformation restructuring than n_O-n_P interactions. It is these latter interactions which cause the broad variation in ionization potential of the n_P orbital. The detailed study of electron and spatial characteristics of the phosphorus-ester bonds reveals their influence on the chemical properties of the compounds, particularly the basicity of the unshared trivalent phosphorus electron pair. With transition from gauche to transconformers, basicity decreases. Figures 6; references 38: 20 Russian, 18 Western.
[4-6508]

UDC: 547.241

INTERACTION OF ESTERS OF ACIDS OF TRIVALENT PHOSPHORUS WITH POLYHALOGEN METHANES: CORRELATION EQUATIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 25 Sep 80) pp 1766-1769

KRUTIKOV, V. I., LAVRENT'EV, A. N. and MASLENNIKOV, I. G., Leningrad Technological Institute imeni Lensovet

[Abstract] In order to study the variation in strength of donor-acceptor complexes in the systems $C_2H_5P(OR)_2$+CCl_4 and $C_2H_5P(OR)_2$+$CHCl_3$ as a function of structure of the phosphonites, an attempt is made to discover the correlation equations relating the parameters of complex formation to the structure of the radicals at the phosphorus atom. It was also desired to expand the sequence of P(III) acid esters beyond the ethyl phosphonites. Calorimetric titration was used to prove the existence of complexes and determine the parameters of the formation of complexes of CCl_4 with tripopylphosphate, dimethylmethylphosphonite, dipropylmethylphosphonite and dimethylphenylphosphonite. Figures 2; references 9 (Russian).
[4-6508]

UDC: 543.51:541.63:547.118

MASS SPECTRA OF 1-METHYL-5-ORGANYL-1-OXO-2,8-DIOXA-5-AZA-1-PHOSPHACYCLOOCTANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 19 Jan 81) pp 1769-1771

VITKOVSKIY, V. Yu., VORONKOV, M. G. and KUZNETSOVA, G. A., Irkutsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences

[Abstract] A study is made of the mass-spectrometric decomposition of 1-methyl-5-organyl-1-oxo-2,8-dioxa-5-aza-1-phosphacyclooctanes and 3,7-dimethyl derivatives with R=CH_3. Two directions of decomposition of the molecular ions of these compounds are determined: 1) formation of the $(M-CH_3)^+$ ion as a result of separation of the methyl radical; 2) splitting of the $CH_3(O)P(OH)_2$ fragment as a result of a regrouping process with the appearance of intensive ion-radical peaks in the spectra. Reference 1 (Russian).
[4-6508]

UDC: 547.26.118.07

CHEMICAL TRANSFORMATION OF PHOSPHORIC ACID HYDRAZIDES: II. INTERACTION OF PHOSPHORIC ACID HYDRAZIDES WITH MONOSACCHARIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 29 Sep 80) pp 1897-1900

OVRUTSKIY, V. M., Kiev Scientific Research Institute of Pharmacology and Toxicology, Ukrainian Ministry of Health

[Abstract] A study is made of the reaction of aryl esters of hydrazido-N,N-di(2-chloroethyl)amidophosphoric acid with monosaccharides--D-glucose, D-xylose and L-arabinose. The reaction of hydrazide hydrochlorides with the monosaccharides was attempted. The reaction was conducted in ethyl alcohol. However, the reaction produced colored noncrystallizing oily substances, from which an unambiguous product could not be obtained. It is assumed that aryl hydrazines are analogous to aryl esters with respect to reactivity with monosaccharides.
The interaction of the bases of the aryl esters in question with monosaccharides was studied. Reaction of monosaccharides with equimolar quantities of the bases forms [O-aryl-N,N-di-(2-chloroethyl)amidophosphinyl]hydrazomonosaccharides (products). The data indicate that the products do not exist in the free crystalline state as true hydrazones, acyclic derivatives, but rather are derivatives of cyclic pyranous forms. References 9: 8 Russian, 1 Western.
[4-6508]

UDC: 547.26'118

1,2-O-ISOPROPYLIDENE-α-D-XYLOFURANOSE CYCLOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 18 Jun 79) pp 1900-1907

NIFANT'YEV, E. Ye., KOROTEYEV, M. P., PUGASHOVA, N. M., KUKHAREVA, T. S. and BORISENKO, A. A., Moscow State Pedagogic Institute imeni V. I. Lenin

[Abstract] It was earlier shown that 2-O-methylxylithane, having a 3, 5-diol ring system, is easily phosphorylated by dimethylphosphite and phosphorous acid hexethyltriamide to form the corresponding cyclophosphites. Expanding these studies, the authors included systems intended for cyclophosphorylation, diol derivatives of monosaccharides. This aritcle is dedicated to the study of the interaction of di- and trifunctional derivatives of phosphorous acid with 1,2-O-isopropylidene-α-D-xylofuranose (I). The work had two purposes: to synthesize new cyclic phosphorus-containing carbohydrate derivatives and to study their properties, and to compare the stereochemical specifics of formally similar but functionally and structurally different condensed phosphorinanes: the bicyclic and tricyclic phosphorinanes. The tricyclic phosphorinanes with chlorine or an alkoxy group at the phosphorus atom are formed and separated as stereo-individual products. Phosphorinanes containing an amido group at the phosphorus are extracted as two stereoisomers. The conversions of cyclic phosphites of 1,2-O-isopropylidene-α-D-xylofuranose produce various derivatives with a tetracoordination atom of phosphorus, modified analogs of natural sugar phosphates. References 3: 2 Russian, 1 Western.
[4-6508]

UDC: 541.653+547.241

STEREOSPECIFIC TRANSITION FROM PHENYL-1-NAPHTHYLTHIOPHOSPHINIC ACID TO THIOETHYL, METHYL ESTERS AND DIETHYL AMIDE OF PHENYL-1-NAPHTHYLPHOSPHINIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 19 Jan 81) pp 1921-1922

CHAUZOV, V. A.

[Abstract] Data are presented on the production of enantiomer thioethyl, methyl esters and diethyl amide of phenyl-1-naphthylphosphinic acid starting with phenyl-1-naphthylthiophosphinic acid. References 2: 1 Russian, 1 Western.
[4-6508]

UDC: 547.26'.118+541.49

SOME PROPERTIES OF NEW REPRESENTATIVES OF CYCLIC PHOSPHORUS DITHIO-ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 12 Jan 81) pp 1922-1923

OVCHINNIKOV, V. V., GARIFZYANOV, A. R., POLOZOV, A. M., CHERKASOV, R. A. and
TOROPOVA, V. F., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] In order to expand the range of cyclic derivatives of the phosphorus dithio acids, a number of representatives of the cyclodithiophosphates and 5-membered cycloanalogs were synthesized. The values of pK (benzene), E^0(b) and log β_2 of nickel complexes were determined for a number of the phosphorus dithio acids synthesized. References 4 (Russian).
[4-6508]

UDC: 546.18

PHOSPHORYLATION OF 2,2,6,6-TETRAMETHYL-4-OXYPIPERADINE-1-OXYL BY DIAMIDOPHOSPHENIC ACID AMIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 8, Aug 81
(manuscript received 16 Feb 81) pp 1923-1924

ROMANENKO, V. D., RUBAN, A. V., POLUMBRIK, O. M. and MARKOVSKIY, L. N.,
Institute of Organic Chemistry, Ukrainian Academy of Sciences

[Abstract] Using diamidophosphenic acid amides as neutral phosphorylating agents, the authors synthesized previously unknown spin-labeled amidophosphates on the basis of 2,2,6,6-tetramethyl-4-oxipiperidine-1-oxyl. Phosphorylation of the latter by diamidophosphenic acid amides occurs under mild conditions (ether, 20°C, 10 hours) without altering the free valence. The spin-labeled diamidoimidophosphoric acid esters are orange-red paramagnetic crystalline substances stable in storage for long periods of time. The structure of the radicals was determined by EPR, NMR and UV spectroscopy. Phosphorylation of 2,2,6,6-tetramethyl-4-oxipiperidine-1-oxyl with imidophosphenous acid amides leads to short-lived nitroxyl radicals. References 3: 2 Russian, 1 Western.
[4-6508]

UDC:631. 893+661:632,951

PHYSICOCHEMICAL PROPERTIES OF DEFOLIANTS BASED ON MAGNESIUM CHLORATE AND COMPONENTS OF MINERAL FERTILIZERS (TYPE UDM)

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 81
(manuscript received 17 Dec 80) pp 48-51

NABIYEV, M. N., TUKHTAYEV, S., SHAMMASOV, R. E., MUSAYEV, N. Yu. and
BURKHANOV, Sh., Uzbek SSR Academy of Sciences Institute of Chemistry

[Abstract] The key physicochemical properties of aqueous solutions of UDM defoliants based on magnesium chlorate and mineral fertilizer components are presented. UDM preparations are used for the purpose of defoliating cotton plants. Six to eight parts by weight of magnesium chlorate are mixed with 10 to 12 parts by weight of fertilizer to form various UDM preparations, such as UDM-I in which the fertilizer component is ammophos, UDM-II utilizing carbamide, UDM-III utilizing calcium nitrate and UDM-IV utilizing ammonium nitrate. Eighty to 85 percent of the leaves fall when these preparations are used in a single application on cotton plants. Both ground machines and aerial spraying can be employed. Properties of important practical significance are given, such as the stability of the chlorate ion in the composition of the UDM defoliant, which characterizes the preparation time, storage life and application life of defoliants of this type; the density of working solutions, which determines their weight and influences the load-carrying capacity required for aircraft, and the pH of aqueous solutions, which determines suitability for use in aircraft and ground equipment. Loss of chlorate ion in the chlorate-containing defoliants after 10 days does not exceed one percent; the specific gravity of aqueous solutions is at a level of 1.1 to 1.2 g/cm^3, and the pH of solutions varies over a range of 5 to 9.8. Special containers or equipment are not needed for preparation and application of defoliants of this type in cotton growing. The addition of fertilizer components to magnesium chlorate makes it possible to control the hygroscopic capacity of this substance and retard the rate of sorption in leaves. Mixing a strongly hygroscopic defoliant such as $Mg(ClO3)_2 \cdot 6H_2O$ with nitrogen-phosphorus fertilizers averages the moisture capacity of the composition for the conditions of Central Asia, at the same time reducing the rate of penetration of the oxidizing preparation into leaves and of its effect on the physiological-biochemical processes of the plants. Figures 1; references 4 (Russian).
[2-8831]

UDC 613.632.4:615.285.7.012]-074

METHOD FOR SEPARATE DETERMINATION OF ATRAZINE, PROMETRYN AND SIMAZINE IN AIR IN PRODUCTION OF COMBINED PREPARATIONS 'AGELON' AND 'SITRIN'

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 7, Jul 81 (manuscript received 12 Feb 80) pp 51-52

PILENKOVA, I. I. and YURKOVA, R. G., Ufa Branch of the Institute of Chemical Agents for Plant Protection

[Abstract] A chromatographic procedure is described for making a separate determination of atrazine, prometryn and simazine in the air in the process of producing "Agelon" and "Sitrin." "Agelon" is a combined preparation based on atrazine and prometryn and is used for combating annual dicotyledonous and herbaceous weeds in maize crops and "Sitrin" is a preparation based on prometryn and simazine and used for combating annual dicotyledonous weeds in potato crops. A unified method is required for making a separate determination of the components of these preparations for purposes of sanitary monitoring of the air in work areas. The maximum permissible concentration of atrazine is 2 mg/m^3, of prometryn 5 mg/m^3 and of simazine 2 mg/m^3. The procedure suggested is a modification of a method for determining simazine on a thin layer of aluminum oxide with chloroform as the solvent. The labor-intensive operation of preparing glass plates for aluminum oxide is eliminated by chromatographing in a thin layer of silica gel, using Czechoslovak "Silufol" plates. Chloroform and hexane : acetone (3:1) are used as the solvent. Simazine and atrazine appear in the form of gray spots against a light background. Distinct intensely colored spots were obtained by using as a developer equal volumes of aqueous solutions of silver nitrate (two percent) and bromphenyl blue (0.4 percent) followed by treatment with a 4-percent aqueous solution of citric acid. Prometryn and atrazine are seen as light blue spots and simazine as light blue or rose-colored spots against a light background when this developer is used. The coloring is stable for 15 min. This method is suitable for a separate determination in the air of atrazine and prometryn in the production of "Agelon" and of simazine and prometryn in the air in the production of "Sitrin" and of all three components if the production of "Agelon" and "Sitrin" are combined. The minimum detectable quantity is 1 µg of each substance and the sensitivity of the method is 0.5 µg/m^3. References 3: 2 Russian, 1 Western.
[1-8831]

PETROLEUM PROCESSING TECHNOLOGY

UDC 547.92

POLYCYCLIC HYDROCARBONS FROM 450-520°C FRACTION OF MANGYSHLAK, ARLAN AND SAMOTLOR CRUDE

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 4 Jun 80) pp 163-171

USHAKOVA, I. B., SANIN, P. I., GENEKH, I. S., ZAIKIN, V. G., SALYKHOVA, T. M., SEMANYUK, R. N. and KOGAN, L. O., Institute of Petrochemical Synthesis im. A. V. Topchiyev, USSR Academy of Sciences

[Abstract] Polycyclic steranes and triterpanes from the 450-520°C fractions of vacuum gas oils from Mangyshlak, Arlan and Samotlor crude were identified and quantified. The physical properties and chemical composition of gas oils, determined by spectral and mass-spectral analysis, and the physicochemical characteristics, composition and yield from distillation of isoalkane--naphthenic fractions of the gas oils are presented. In Mangyshlak crude, hydrocarbons forming adducts with thiocarbamide consisted of six C_{27}-C_{30} steranes: cholestane (22% of the concentrate), ergostane (24%), isoergostane (5%), isostigmastane (14%), 4-methylergostane (about 2%) and 4-methylstigmastane (about 2%), and five normal alkanes (C_{24}-C_{28}). The hydrocarbons not forming adducts with thiocarbamide consisted of 10 triterpanes (C_{27}-C_{32}) that were homologs of $17\alpha H$-hopane and their isomers, and nine isoalkanes (C_{26} and C_{27}). The total amount of steranes in oil was 0.007% and of triterpanes 0.03%. In Arlan crude, hydrocarbons forming adducts with thiocarbamide consisted of six steranes (C_{27}-C_{28}), including cholestane (48% of the concentrate, ergostane (28%) and isoergostane (2.0%), and those not forming adducts with thiocarbamide consisted of stigamastane and 10 triterpanes also of the hopane series. The steranes comprised 0.001% of the crude and triterpanes 0.03%. Samotlor crude contained no steranes but did contain 12 triterpanes of the hopane series, which comprised 0.01% of the crude. Figures 2; references 5: 4 Russian, 1 Western.
[108-9307]

UDC 547.217.6:542.941.8

DEHYDROGENATION OF n-DODECANE ON ALUMINOPLATINUM CATALYSTS

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 10 Dec 79) pp 186-190

TYJPAYEV, A. P., TIMOFEYEVA, Ye. A. and ISAGULYANTS, G. V., Institute of Organic Chemistry im. N. D. Zelinskiy, USSR Academy of Sciences

[Abstract] The effect was studied of the addition of lithium (0.2-4.0%) to aluminoplatinum catalysts with 0.5% platinum during the dehydrogenation of pure n-dodecane in a hydrogen medium (hydrogen:hydrocarbon = 8) at 480°C, 0.26 MPa and $v = 10\text{-}100\ h^{-1}$, on catalyst selectivity and activity and unit surface of platinum. Lithium reduced the total activity of the catalyst primarily because of cracking and isomerization on the carrier, but increased selectivity for olefins. Catalysts with 0.5-1.0% lithium exhibited maximum selectivity for olefins at all major conversion rates (up to 20%). Addition of lithium to aluminoplatinum catalysts reduced platinum unit surface but specific activity per square meter during alkane conversion remained unaltered. Figures 2; references 6: 5 Russian, 1 Western.
[108-9307]

UDC 547.313.2:542.952

CODIMERIZATION OF ETHYLENE WITH PROPYLENE IN PRESENCE OF GEL-IMMOBILIZED METALLOCOMPLEX SYSTEMS

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 15 Apr 80) pp 199-204

LUNIN, A. F., VAYZI, Z. S., IGNATOV, V. M., SMETANYUK, V. I. and PRUDNIKOV, A. I., Institute of Petrochemical Synthesis im. A. V. Topchiyev, USSR Academy of Sciences, and Moscow Institute of the Petrochemical and Gas Industry im. I. M. Gubkin

[Abstract] Two gel-immobilized nickel catalyst systems for codimerization of ethylene and propylene were synthesized: nickel acetylacetonate immobilized on the carriers, a copolymer of ethylene, propylene and nonconjugated diene (SKEPT)--poly-4-vinylpyridine (GCS-1) or SKEPT--1,2-polybutadiene--poly-4-vinylpyridine (GCS-2). These catalysts also contained organoaluminum compounds as immobilized cocatalysts. Ethylene and propylene were codimerized on the catalyst systems under mild conditions (20-80°C, 0.2-0.3 MPa). The pentene fraction composition (64-65 wt.% n-pentenes and 35-36 wt.% isopentenes) was not affected by the ethylene:propylene ratio. The highest pentene yield (46 wt.%) was obtained at an ethylene:propylene ratio of 1. Use of aromatic hydrocarbons and organochlorine solvents deactivated the catalyst within hours. Catalysts retained their activity for a long time in an alkane medium (heptane), which also did

not affect reaction product composition. The catalysts remained highly active over a broad temperature range with a maximum at 40-60°C. GCS-1 was more active than GCS-2, which is attributed to additional support cross-linking in the former. An advantage of GCS-2 was the absence of any catalyst system components in the solution. The use of these catalyst systems increased the proportion of normal pentenes and inhibited isomerization of alpha-pentenes. Figures 2; references 4 (Russian).
[108-9307]

UDC 547.214:542.97

ALKYLATION OF ISOBUTANE WITH BUTENES IN PRESENCE OF ZEOLITE HNaY, MODIFIED BY CATIONS OF NICKEL, CALCIUM AND RARE EARTH ELEMENTS

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 27 Jun 80) pp 216-220

KUZNETSOV, O. I., PANCHENKOV, G. M., PLAKHOTNIK, V. A., RAZALI, B. and TOLKACHEVA, Ye. I., Moscow Institute of the Petrochemical and Gas Industry im. I. M. Gubkin

[Abstract] The alkylation of isobutane with n-butenes in the presence of ion-exchange forms of zeolites, containing Ni^{2+}, Ca^{2+}, La^{3+} and Gd^{3+}, at an optimal SiO_2/Al_2O_3 ratio (5.7) was studied. Introduction of Ni^{2+} into calcium zeolites containing rare earth elements reduced butene conversion and the alkylate yield, but calcium-nickel zeolites without rare earth elements exhibited high selectivity for the formation of the trimethylpentane fraction. Use of zeolite HCaY with La^{3+} and Gd^{3+} in this reaction increased the content of the isooctane hydrocarbons in the alkylate and decreased the fraction of C_9 and higher hydrocarbons. The introduction of 20 wt.% gamma-Al_2O_3 into HLaCaY significantly reduced butene conversion and the alkylate yield. References 6: 5 Russian, 1 Western.
[108-9307]

UDC [547.215+547.313.2]:66.095.253.7

ALKYLATION OF ISOPENTANE WITH ETHYLENE IN PRESENCE OF ALUMINUM CHLORIDE--DIETHYL ETHER COMPLEX

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 28 Dec 79) pp 221-225

GLOZSHTEYN, A. Ya., SIDOROV, V. A., POLYAKOV, S. A. and RAKITA, I. M., All-Union Scientific Research Institute of Petrochemical Processes, Leningrad

[Abstract] The $AlCl_3$--diethyl ether complex began to exhibit catalytic activity in the alkylation of isopentane with ethylene at $AlCl_3$ concentrations greater than the stoichiometric. The highest alkylate yield was obtained with the use

of a catalyst containing 1.4 moles of $AlCl_3$, but a further increase in the $AlCl_3$ level reduced the yield of alkylation products, the C_7 fraction, and increased the levels of other fractions, C_6-C_9 and higher. If ethylene pressure was increased and temperature reduced, the alkylate yield increased with a concomitant decrease in the level of the desired heptane fraction. An alkylate with the optimal composition was obtained with the shortest reaction time; an increase in the isopentane:catalyst ratio from 1:1 to 19:1 had a similar effect. In both cases, yield decreased as alkylate quality improved. Figures 1; references 14: 7 Russian, 7 Western.
[108-9307]

UDC 547.313:542.92

INITIATION OF THERMAL DEGRADATION OF 1-HEXENE BY ALLENE

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 12 May 80) pp 239-242

KORZUN, N. V., MAGARIL, R. Z. and TRUSHKOVA, L. V., Tyumen' Industrial Institute

[Abstract] Allene reduced the activation energy for 1-hexene degradation by about 98 kJ/mole without affecting degradation product composition; this indicates that pyrolysis acceleration is related to allene's participation in chain initiation with bimolecular radical formation during disproportionation of allene with 1-hexene. Figures 3; references 8 (Russian).
[108-9307]

UDC 547.214:542.943.7

LIQUID-PHASE OXIDATION OF ISOBUTANE DURING HETEROGENEOUS CATALYSIS WITH COBALT AND MOLYBDENUM BORIDES AND MOLYBDENUM CARBIDE, OBTAINED BY SELF-PROPAGATING HIGH-TEMPERATURE SYNTHESIS

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 4 Mar 80) pp 250-253

KHIRNOVA, G. P., BULYGIN, M. G. and BLYUMBERG, E. A., Institute of Physical Chemistry, USSR Academy of Sciences

[Abstract] Isobutane oxidation products in the presence of CoB, MoB_2 and MoC were tert-butyl hydroperoxide (TBH), tert-butyl alcohol (TBA) and acetone. The rate of catalyzed isobutane oxidation was substantially higher than without catalysts, and was determined by free-radical formation during catalyst-induced TBH degradation. The primary product of TBH degradation in n-decane during catalysis by MoB_2 was TBA, formed from RO-type radicals; TBH degradation rate and alcohol formation increased considerably as MoB_2 concentration increased.

Di-tert-butyl peroxide, a product of the recombination of TBH radicals, was found after degradation of TBH in the presence of MoB_2. Significant for the industrial application of this process is the fact that the 75-80% selectivity of product formation during isobutane oxidation at 135°C is not affected by the use of catalysts. This selectivity was retained up to a 20% conversion rate. Optimal reaction temperature was 135-150°C. Figures 2; references 7 (Russian).
[108-9307]

UDC 665.753.2.542.943

EFFECTIVENESS OF INHIBITORS DURING OXIDATION OF JET FUEL WITH INITIATOR

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 8 Jan 80) pp 287-298

KOVALEV, G. I., DENISOV, Ye. T., GERASIMOVA, A. V., NIKONOVA, A. G. and BORISOVA, L. K.

[Abstrac]] Kinetic characteristics of 50 aromatic amines, phenols, aminophenols and phosphorus-containing compounds, which may act as jet fuel oxidation inhibitors, were studied. Each class of inhibitors had a typical kinetic curve for initiated oxidation. Oxidation characterized by a brief induction period followed by a constant oxidation rate was typical for phenols and most aminophenols. A less marked induction period followed by a gradually increasing oxidation rate was typical for most aromatic amines. Total inhibition during the induction period and an oxidation rate always lower than noninhibited oxidation were typical for the most effective inhibitors. Phenols and aromatic amines terminate chains during fuel oxidation at a stoichiomecric inhibition factor of 1-2 per inhibiting group in the molecule. Alkyl phenols and diatomic aromatic amines were the most effective inhibitors at 125°C. Oxidation of fuel with an initiator (cumyl peroxide) at 125°C did not permit determination of effective inhibitors because of the nonchain-like nature of oxidation. Figures 1; references 5 (Russian).
[108-9307]

UDC 547.298.4:621.892.86

SYNTHESIS AND STUDY OF SOME PHENYLACETOTHIOAMIDES AS LUBRICANT ADDITIVES

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 13 Mar 80) pp 299-302

KULIYEV, A. B., DZHAVADOV, M. M. and KULIYEV, F. A., Institute of the Chemistry of Additives, Azerbaijan Academy of Sciences

[Abstract] Phenylacetothioamides were synthesized by reacting acetophenone with sulfur and various amines according to the Sillgerodt-Kindler reaction. Structure

and physical constants are given for the thioamides. The thioamides exhibited good anticorrosive properties when used in oil DS-II, decreasing corrosion from 180-200 g/m^3 to 0.1-17.8 g/m^3; amides with phenyl radicals exhibited higher anticorrosive properties than amides with aliphatic or heterocyclic radicals. Phenylacetothioamides also improved antiwear properties of oil TB-20. Amides with heterocyclic radicals were more effective than amides with phenyl or alkyl radicals. These studies showed that an increase in the amount of sulfur in the molecule from 9.79 to 16.59% slightly improved the antiwear properties of the thioamides. References 3 (Russian).
[108-9307]

UDC 547.339:542.91

SYNTHESIS OF ACRYLONITRILE FROM ACETONITRILE AND METHANE

Moscow NEFTEKHIMIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 23 Jun 80) pp 303-308

KHCHEYAN, Kh. Ye., SHATALOVA, A. N., TEMKIN, O. N. and REVENKO, O. M.,
All-Union Scientific Research Institute of Organic Synthesis

[Abstract] Acrylonitrile, as well as proprionitrile and hydrocyanic acid, is synthesized from acetonitrile and methane at 700-800°C in the presence of oxygen and potassium bromide in quartz as the catalyst. Results of kinetic studies and kinetic equations for the rates of acrylonitrile and proprionitrile formation are presented and a mechanism for the synthesis, including a stage in which reagents and intermediate products are adsorbed, is proposed. Kinetics were studied at a rate of 2860 h^{-1}, 750°C, total partial reagent pressure of 0.1 MPa, and a component ratio of $CH_3CN:CH_4:O_2:H_2O:N_2 = 1:2:0.39:0.74:3$. Figures 2; references 2 (Russian).
[108-9307]

UDC 66.094.38

USING HETEROGENIC TIN-SODIUM-CRYSTALLINE IODINE ALLOY SYSTEM TO INHIBIT PROCESSES OF OIL OXIDATION IN OPERATING INTERNAL COMBUSTION ENGINE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 7, Jul 81 p 1671

PORAY-KOSHITS, A. B., KALYANOV, V. P., ASHKINAZI, L. A., PANICHKINA, O. M.
and KURAKIN, A. S.

[Abstract] The effect of a heterogenic tin-sodium-crystalline iodine alloy system on the aging of motor oils was studied. The possibility was shown of using the system as a solid motor-oil-aging inhibitor based on data of infrared, ultraviolet and emission spectroscopy and micrometric measurements of the engine.
[120-6521]

UDC: 66.097.8:665.521.3

ANTIOXIDANT ADDITIVES OF NEW TYPE FOR MOTOR FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 81 pp 21-23

CHERTKOV, Ya. B., MARYAKHIN, N. M. and BEREZINA, R. M.

[Abstract] An attempt is made to demonstrate the possibility of protection of motor fuels from oxidation by the air, for example by a copolymer of methacrylic acid esters and C_8-C_{12} aliphatic basic alcohols of normal structure with two-methyl-5-vinylpyridine. This copolymer, called PMAM-2, is easily soluble in petroleum products. It is recommended as an additive to improve the viscosity properties of lubricating oils and increase the thermal stability of fuels. The substance is found to prevent by its own oxidation the oxidation of a complex mixture of motor fuels in liquid phase by the oxygen of the air. Figures 1; references 6: 4 Russian, 2 Western.
[103-6508]

UDC: 662.75:66.084.38

INDUSTRIAL ANTIOXIDANTS FOR FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 81 pp 26-28

SABLINA, Z. A., TISHINA, Ye. A., KACHURINA, G. V., VAZHNIK, Ye. Ya. and
LAZARENKO, V. P.

[Abstract] A study is presented of specimens of certain industrial foreign-made [non-Soviet] antioxidants and the effectiveness of their action in fuels of various types as compared with the effectiveness of known domestic antioxidants under equivalent conditions. Several methods were used to estimate the effectiveness of the antioxidants, including new research laboratory methods. The antioxidants were added to the fuels primarily in the concentrations recommended for industrial application. The best results were obtained with alkylphenol antioxidants (Topanol' A and Topanol' 0). In terms of inhibition of the accumulation of hydroperoxides (Topanol' A was most effective) p-hydroxydiphenylamine and NG-2446 were also effective. The addition of even very slight quantities of industrial antioxidants helps to increase the stability of a fuel composition a great deal in comparison to fuel without additives. The best results in gasoline were provided by FCh-16 and p-hydroxydiphenylamine; in jet fuels, by Topanol' A and NG-2246. References 6: 5 Russian, 1 Western.
[103-6508]

UDC 547.496.3:665.753.2

SYNTHESIS OF THIOCARBAMIDE DERIVATIVES OF 2,6-DI-tert-BUTYLPHENOL AND INVESTIGATION OF THEIR EFFECT ON ANTIOXIDATION STABILITY OF JET FUELS

Moscow NEFTEKHIMIYA in Russian Vol 21, No 3, May-Jun 81
(manuscript received 13 Mar 80) pp 467-471

SHAULOV, V. S., GLEBOVA, Ye. V. and VISHNYAKOVA, T. P., Moscow Institute of the Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] Five new thiocarbamide derivatives of 2,6-di-tert-butylphenol were synthesized and their effect on the antioxidation stability of jet fuels was studied. Mono-substituted thiocarbamides were reduced by reaction of sulfuric acid amines and ammonium rhodanide in an aqueous medium at boiling point for 7 hours. The initial contents for synthesis of the thiocarbamide derivatives of 2,6-di-tert-butylphenol were industrial 2,6-di-tert-butylphenol and 2,6-di-tert-butyl-4-methylphenol. The effectiveness of the action of additives depends on their structure, as mono-substituted thiocarbamides essentially do not inhibit the oxidation process in the fuel. Symmetrically-disubstituted thiocarbamides considerably improved the acidity and peroxide number of the fuel and thus inhibit oxidation. All the thiocarbamide derivatives of 2,6-di-tert-butylphenol increase the optical density of the fuel and this is related to formation of stained intermediate compounds during heating. Figures 2; references 8 (Russian).
[127-6521]

UDC 665.7.038.5 665.634:629.73

INVESTIGATING COMPOSITION OF ANTIOXIDATION ADDITIVES TO STABILIZE JET FUELS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, Jul 81 pp 9-11

TUMAR, N. V., VISHNYAKOVA, T. P., GOLUBEVA, I. A. and ZARIPOVA, N. A., Moscow Institute of the Petrochemical and Gas Industry imeni Academician I. N. Gubkin

[Abstract] The effectiveness of action of sulphur-, phosphorus- and nitrogen-containing compounds in compositions with other phenolic antioxidants of 2-tert-butyl-5-methylresorcine, 4,6-ditert-butylresorcine and 6,6-methylene-bis-(2-tert-butyl-dioxybenzene) were investigated with respect to stabilization of jet fuels. Compositions of 2-tert-butyl-5-methylresorcine and 4,6-ditert-butylresorcine with isopropylphenyl-n-phenylenediamine did not produce an additional additive effect of the components contained in them. A composition of 4,6-ditert-butylresorcine and zinc didecyldithiocarbamate showed an antagonistic effect in that the acidity and optical density of the fuel were worse in all ratios of the components than when individual components of this composition were used in the same concentration. The components as additives to jet fuel show a synergistic effect on the duration of the entire test process. The components break the kinetic oxidation chain and thus reduce the yield of

hydroperoxide. The chain-breaking reaction considerably exceeds the rate of decomposition of the hydroperoxides at concentrations above critical and the additive effectively inhibits the oxidation processes in the fuel. Figures 3.
[128-6521]

UDC 665.7.032.57 665.537.88

VARIATION OF PROCESS OF PRODUCING OXIDIZED SHALE BITUMENS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, Jul 81 pp 14-15

ALEKSANDROVA, L. M., SHUL'MAN, A. I. and RUBTSOV, G. Ye., Slantsy Shale Production Plant

[Abstract] A plan for realizing a complex scheme for refining shale resin that includes preparation, distillation and coking of heavy fractions, was investigated as an alternative to the present method of using a resin of semicoked fuel shales as raw material to produce oxidized bitumens. The possibility of oxidizing the shale remainder was checked by using a pyrolysis installation as a source of condensed aromatic compounds of hydraulic resin. Bitumens produced during joint oxidation of the residue and hydraulic resin are inferior in physical and chemical properties to those produced during oxidation of the residue alone.
[128-6521]

UDC 662.764:66.074.36

PRODUCTION OF HYDROGEN FROM COKING GAS BY SHORT CYCLIC ADSORPTION METHOD

Moscow KOKS I KHIMIYA in Russian No 6, Jun 81 pp 27-29

PODOROZHANSKIY, M. M., PLICHKO, V. S., SHUSTIKOV, V. I. and YAVORSKAYA, Z. G., Scientific Research Institute of Coal Chemistry

[Abstract] Separation of coking gas at a pilot plant with adsorbers filled with SKT-2 activated charcoal was investigated to produce hydrogen. The short cyclic adsorption method makes it possible to produce commerical hydrogen for use in hydraulic purification processes. An equation was derived that describes the degree of hydrogen purity as a function of the productivity of the adsorbent unit, the amount of purging gas and the length of the cylce. There is a substantial effect of the fraction of purging gas on the hydrogen productivity of the plant. The productivity of the unit volume of adsorbent decreases in inverse proportion to an increase of the cycle length. Figures 2; references 6: 5 Russian, 1 Western.
[121-6521]

UDC 66.092:662.75

JET FUEL FROM COAL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 81 pp 3-5

KRICHKO, A. A., YULIN, M. K., ARIFULIN, A. S., NIKIFOROVA, T. S. and PUCHKOV, V. A., Institute of Fossil Fuels

[Abstract] It was shown earlier to be possible to produce "coal petroleum" by hydrogenation of brown coal over Mo-Fe catalyst. In this paper results were reported on production of thermally-stable fuel obtained from the 180-320°C fraction of crude produced by liquid phase hydrogenation of brown coal from the Irsha-Borodinsk deposits. The crude was hydropurified over an AlCoMo catalyst and isomerized; the aromatic components were hydrogenated over Pd and the products were distilled to yield three gross fractions. The material distilling at temperatures below 160°C was used for the production of automobile gas. The 160-250°C fraction represented the jet fuel material and the product coming over at temperatures above 250°C was used for the production of diesel fuel. This technology makes it possible to perform the entire process at low hydrogen pressure, avoiding the need for expensive and complicated carbamide deparaffinization. Figures 1; references 8 (Russian).
[11-7813]

UDC 621.436:665.452.2

PRODUCTS OF SHALE REPROCESSING USED AS DIESEL FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 81 pp 6-7

KORNILOV, V. V., Latvian Branch of the Central Scientific Research Institute of the Maritime Fleet

[Abstract] One of the most promising substituents for petroleum in the near future is shale oil. Shale oil reserves are large, surpassing by far those of petroleum. Properly processed shale oil yields a shale tar which resembles crude petroleum oil in composition and properties. Because of easily obtainable gas and oil in the past, shale oil production was neglected. To obtain liquid fuel, solid shale is subjected to thermal decomposition, producing shale tar; all the technical processes are laborious and consume a lot of energy. Shale oil processing is similar to that of petroleum processing. Its low boiling fraction contains principally normal unsaturated hydrocarbons. The middle fractions contain 40% of nonhydrocarbon components and no hydrocarbons could be isolated from the high boiling fractions. It was shown that diesel fractions obtained from shale oil compared well with petroleum diesel oil. This material could be used effectively in tractor and in ship diesel engines. References 4 (Russian).
[11-7813]

UDC 665.7.032.57

CHARACTERISTICS OF COMPOSITION AND PROPERTIES OF FUEL SHALES AS RAW MATERIAL TO PRODUCE SYNTHETIC LIQUID FUEL

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 3, May-Jun 81 pp 16-21

UROV, K. E. and KLESMENT, I. R., Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] Fuel shales and shale-like rock of more than 40 fields in the Soviet Union and foreign countries were investigated at the Institute of Chemistry, Estonian SSR Academy of Sciences. The yield and composition of the thermal breakdown resin of fuel shales depend on the chemical structure of the kerogen, the adsorption properties of the mineral part and the conditions of conducting the process. The optimum conditions for decomposition must be combined with complex use of the breakdown products to produce synthetic fuel. The competitiveness of shales as a source of synthetic liquid fuel is a function of the complexity of refining them, including more complete utilization of the organic products of decomposition and the mineral part of the shale. The shale industry can be developed through universal untilization of the different components of shale fuels to produce a useful product. Figures 3; references 10: 8 Russian, 2 Western.
[124-6521]

UDC 665.658.26:665.633

HYDROCRACKING-HYDROPURIFICATION OF HIGH-SULFUR GASOLINE FROM DIRECT DISTILLATION

Moscow KHIMIYA I TEKHNOLOGYIA TOPLIV I MASEL in Russian No 9, Sep 81 pp 10-12

KOZLOV, I. T., KHAVKIN, V. A., AGAFONOV, A. V., ZENCHENKOV, A. N., KARPEYEV, V. M., SHEVELEV, Yu. V. and MILYUTKIN, V. S., All-Union Scientific Research Institute of Petroleum Processing, "Kuybyshevnefteorgsintez"

[Abstract] Hydrocracking-hydropurification of gasoline distillates from sulfur-containing petroleum was performed over a double catalytic system consisting of Al-Co-Mo and Al-Ni-Mo catalysts. The final product contained less than 0.0001% of sulfur and nitrogen. Under selected conditions, the yield of highly-purified catalytic reforming was 81-83% by weight; the yield of high-octane isoparaffin fraction (C_5-85°C) was 10%. This material could be used as an additive to automobile gasoline. This technology was verified in an industrial plant with positive results. Figures 3; references 1 (Russian).
[11-7813]

UDC 665.64.442

EFFECT OF FRACTIONAL COMPOSITION OF CRUDE ON YIELD AND OCTANE NUMBER OF GASOLINE FROM CATALYTIC REFORMING

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 81 pp 12-15

MASLYANSKIY, G. N., SHAPIRO, R. N., PANNIKOVA, G. F. and POTAPOVA, A. A., "Lenneftekhim"

[Abstract] The crude material used for the production of high octane gasoline differs widely in its composition. To evaluate the effect of these fractions on the catalytic reforming, the crude oil from one of the commerical plants was distilled producing five fractions which were then subjected to catalytic reforming over a polymetallic catalyst KR-104 at 475 and 495°C. It was shown that, with increased molecular weight, the yield of the reforming output increases, especially at the higher temperature. The yield of aromatic hydrocarbons increases sharply going from the lowest fraction to the next one, and then grows gradually. The dehydrocyclization reactions of paraffin hydrocarbons increases also with increased molecular weight of the fraction. Transition from light to heavy fractions is accompanied by higher octane number and increased yield of the reforming product. In general, it was found that the catalytic reforming process will be detrimentally affected by enrichment of the crude with low boiling fractions as well as by its depletion of the high boiling material. Figures 3; references 3 (Russian).
[11-7813]

UDC 665.753.2.038

N'-ACYL DERIVATIVES OF N-SUBSTITUTED UREAS USED AS STABILIZERS FOR JET FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 81 pp 23-25

GUTNIKOVA, L. P., VISHNYAKOVA, T. P., GOLUBEVA, I. A., PECHENKIN, A. G. and BUGAYEVA, L. I., Moscow Institute of the Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] The goal of this study was to evaluate the effectiveness of N'-acylaminoacyl- and N'-acylalkyl derivatives of N-substituted ureas on stabilization of T-6 fuel. These additives were used at 0.003% level and compared to the standard antioxidant, the ionol. The results have shown that all N'-acylalkyl derivatives were ineffective as antioxidants. N'-Acylaminoacyl derivatives were as effective as ionol; the most effective were N-phtalylisoleucyl derivatives and urea derivatives containing sulfur. At 180°C the indices of the fuels containing 0.003% additives did not differ from those of the additive-free fuel. References 3 (Russian).
[11-7813]

UDC: 665.581.5:547.543

JOINT THERMAL HYDROGENIZATION CONVERSIONS OF AROMATIC AND NONAROMATIC HYDROCARBONS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 81 pp 5-7

AKHUNDOVA, R. R., ALIYEV, R. M., KAMBAROV, Yu. G., NADZHAFOV, N. N. and
ISAYEV, Kh. G., All-Union Scientific Research Institute of Olefins

[Abstract] The purpose of this work was to determine the basic regularities of joint hydrogenization conversions of aromatic and nonaromatic hydrocarbons. Thermal hydrogenization conversions of individual toluene and artificial model mixtures of toluene with n-octane and cyclohexane were studied. The experiments were performed at moderate temperatures. Data on the transformations of binary mixtures of toluene and n-octane (9:1) and toluene and cyclohexane (9:1) and pure toluene show that the presence of n-octane and cyclohexane significantly accelerates hydrodemethylation of the toluene. The more rapid hydrocracking reaction of nonaromatic hydrocarbons is accompanied by the formation of a large quantity of reactive radicals which facilitate generation of phenyl and benzyl radicals, atomic hydrogen and other initiators of the radical-chain reaction of hydrodemethylation of toluene. The addition of only 1% n-octane or cyclohexane significantly increases the degree of hydrodealkylation of toluene. The degree of hydrodealkylation of toluene is almost identical for 5- and 3-component mixtures. The degree of hydrodealkylation of m-xylene at 625 and 650°C with 10-30 s contact time is approximately 1.5 times greater than that of toluene. The presence of other aromatic hydrocarbons in addition to toluene does not significantly influence the course or depth of hydrocracking of nonaromatic components. References 6: 4 Russian, 2 Western.
[103-6508]

UDC: 542.951.12

CONVERSION OF HYDROCARBONS DURING HYDRODEAROMATIZATION OF KEROSENE DISTILLATES

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 81 pp 9-11

RADCHENKO, Ye. D., KHAVKIN, V. A., KHOTS, M. S. and CHERNAKOVA, G. N., All-Union Scientific Research Institute of the Oil Industry

[Abstract] The purpose of this work was to compare and study an approximate plan of the chemical conversions of a group of hydrocarbons upon hydrodearomatization of kerosene distillate on a palladium catalyst. The experiments were performed in a channel installation at 1.96-9.80 MPa, circulation of hydrogen-containing gas 500-1500 m^3/m^3, temperature 280-360°C, space velocity of raw material feed 1-4 hr^{-1}. The equations are presented describing the summary variation of hydrogenization rates, total, desirable and undesirable splitting as functions of the parameters of the process. The catalyst performed hydrogenation and splitting functions identically in this process. Significant specific pecularities are

found for the individual reactions. The results show the possibility of optimization of the process of hydrodearomatization and indicate the need for development and application of catalysts having high hydrogenation function with the maximum possible suppression of the reactions which destroy the raw materials. Figures 3; references 4 (Russian).
[103-6508]

UDC: 665.767:621.22.004

CLASSIFICATION OF MINERAL WORKING FLUIDS FOR HYDRAULIC SYSTEMS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 81 pp 18-19

ZAGORODNIY, N. G., SHIROKOVA, G. B., BOGDANOV, Sh. K. and SHKOL'NIKOV, V. M., All-Union Scientific Research Institute of the Oil Industry

[Abstract] Working fluids are classified by chemical nature, physical and operating properties, areas of application, etc. In 1975, international standard ISO3488-75, "Industrial lubricants. System of classification by viscosity" was approved, dividing petroleum products in terms of viscosity at 40°C and 18 grades encompassing the range from 2 to 1500 mm^2/s. The authors suggest a classification for mineral-based hydraulic fluids for aircraft, motor vehicles and ships. The classification does not include fluids for industrial equipment, due to the great difference in usage conditions. The classification includes three series of fluids supporting operating of hydraulic systems at ambient air tmmperatures of -65 to +55°C and allowing standardization of a large number of petroleum products used as hydraulic fluids. Each series includes 10 viscosity classes, division among which is based on ISO-3448-75. The classification will facilitate the selection of the necessary hydraulic fluid and bring Soviet classification into conformance with international classification. References 4 (Russian).
[103-6508]

UDC 547.732:542.91

SYNTHESIS OF 2-METHYL-4-ALKYL(ARYL)THIACYCLOHEXANES

Moscow NEFTEKHIMIYA in Russian Vol 21, No 3, May-Jun 81
(manuscript received 27 May 80) pp 459-466

VOLYNSKIY, N. N. and PEREPELITCHENKO, L. I., Institute of Petrochemical Synthesis imeni A. V. Topchiyev

[Abstract] The title compounds have not been described in the literature. These compounds can be useful as model sulfides to study sulfurous concentrates of kerosene fractions of sulfurous petroleum. The authors propose their synthesis

in four steps, using hydrobromination of alpha-olefins to form secondary bromides with yields greater than 90 percent and complete absence of isomer products. The sulfur is introduced into the ring by treatment with Na_2S.
References 17: 9 Russian, 8 Western.
[127-6521]

PHARMACOLOGY AND TOXICOLOGY

ANNUAL GENERAL MEETING OF SECTION OF BIOCHEMISTRY, BIOPHYSICS, AND CHEMISTRY OF PHYSIOLOGICALLY ACTIVE COMPOUNDS, USSR ACADEMY OF SCIENCES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 81 pp 2174-2176

[Editorial report, no author indicated]

[Abstract] The keynote speech by A. A. Bayev stressed the results of research in the section and its tasks in the coming 5-year plan period. The area of biotechnology must make contributions to the development of new products for medicine, agriculture and industry. Successes have been achieved by institutes of biology and microbiology in developing feed and fodder proteins, transforming organic compounds and using biologically active bacteria. Studies have been made of ginseng, dioscorein and Rauwolfia, in the general area of genetic engineering. Other areas of intensive research include membranology, protein-peptide chemistry, the organization of equariot genomes, protein-synthesis mechanisms and applied microbiology. Results of DNA and RNA research are summarized, and include the determination of the primary structure of *beta*-sub-units, and the centrosymmetrical structure of an analog of valinomycine. X-Ray structural analysis was used to determine the C2 ribonuclease structure in aspergill, and other microbiological structures. Practical results include preparations such as new acaricides and natural insect hormones. Tests have been conducted on a new compound, designated hydrel, for use as a defoliant for cotton and a growth regulator for tomatoes and cucumbers.

[19-12131]

UDC 628.543.5.66.062.855.11.541.697

TOXICITY AND MAXIMUM PERMISSIBLE CONCENTRATION OF MONOETHANOLAMINE FOR BIOCHEMICAL PURIFICATION

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, Jul 81 pp 56-57

LAKHINA, K. G., KOMAROVA, R. M., GAMAGA, L. I., YAKOBI, L. K. and POPOV, A. S., Novokuybyshev Branch, VNIIOS

[Abstract] The toxicity of monoethanolamine to hydrobionts was studied and the maximum permissible concentration for biological purification plants was established. Monoethanolamine of category 98 percent pure was used as the object of investigation. The toxicity of monoethanolamine to hydrobionts was investigated in aquatic microorganisms and during nitrification processes for two months. The toxicity of the compound to guppies was also determined by the express fish test method for 10 days. The maximum concentrations of monoethanolamine were established at 200 mg/liter for the simplest organisms, 300 mg/liter for saprophytic bacteria, 50 mg/liter for the first phase of nitrification and 20 mg/liter for the second phase of nitrification with respect to aquatic microorganisms. A maximum tolerable concentration of 500 mg/liter, an average lethal concentration of 525 mg/liter and an absolutely lethal concentration of 550 mg/liter were established with respect to guppies. The effect of biochemical purification of model runoff was high, in the range of 94-99 percent, with respect to the permissible concentration during all periods of operation of the filtering tank. The second phase of nitrification was initially inhibited and was then totally suppressed if the concentration of monoethanolamine was in the range of 110 to 130 mg/liter. The maximum permissible concentration of monoethanolamine was set at 100 mg/liter in filtration tanks for biological purification.
[128-6521]

UDC 678.84]01:543.9

BIOLOGICAL EVALUATION OF PROPERTIES OF POLYMETHYL SILOXANES DIFFERING IN VISCOSITY

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 81 pp 35-36

SUSHKO, L. I., KORNEYEVA, N. A. and IGNAT'YEV, A. D.

[Abstract] Silicon organic polymers come in contact with man and with various foods. Biological properties of such polymers, viz., a number of polymethylsiloxanes (PMS), of different viscosities, were investigated using an infusorium of Tetrachimena piriformis as the test object, because its metabolism is similar to that of humans. Experimental results have shown that all PMS's studied were nontoxic and actually neutral. They exhibited a tendency towards antiallergenic reactions. The biological properties of PMS improved with increased viscosity, especially growth-stimulating and antiallergenic properties. This makes it possible to use this type of polymer in various branches of the national economy. References 12: 7 Russian, 5 Western.
[15-7813]

UDC 615.91.015.44:616.155.1+613.632-07:616.155.1-099

CELLULAR AND SUBCELLULAR REACTIONS IN STUDYING INFLUENCE ON BODY OF LOW CONCENTRATIONS OF TOXIC SUBSTANCES

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 7, Jul 81 (manuscript received 7 Jan 81) pp 5-7

SOKOLOV, V. V., GRIBOVA, I. A. and IVANOVA, L. A., Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies conducted at the clinical diagnosis laboratory of the Institute of Labor Hygiene and Occupational Diseases have shown that with the effect of various toxic substances in low concentrations either at the level of the maximum permissible concentration or periodically four to six times higher, with the absence of clinical manifestations of intoxication and substantial deviations in the number of blood cells, structural and functional changes can be detected in cells and organelles, reflecting the effects of damage to them and the development of compensatory adaptation processes. The reduction of the average life of erythrocytes, serving as a sign of damage to these cells, was observed in healthy persons subjected to a longer than 5-year influence of toluene, lead, trinitrotoluene and a multicomponent combination of toxic substances in concentrations close the the maximum permissible. Disturbance of the structure and functional state of cytoplasmic membranes of erythrocytes was observed in practically healthy persons subjected for 5 to 20 years to the intermittent effect of toluene in concentrations of 20 to 500 mg/m^3. By means of a cytochemical study of the activity of energy metabolism enzymes it was found that lead in low concentrations inhibits not only enzymes which take part in porphyrin metabolism, but also other enzyme systems. The development of compensatory adaptation reactions at the cellular and subcellular levels was traced under the influence of beryllium in concentrations not greater than the maximum permissible. Considerable reordering of cell metabolism was observed in persons subjected to the effect of beryllium. The data obtained indicate an increase in the energy potential of cells, representing the basic mechanism of the adaptation and compensation process at the cellular level. The reactions observed at the cellular and subcellular levels should be subjected to further study in that they can provide helpful information for discovering the pathogenetic bases of occupational poisoning and for understanding the general mechanisms of protective reactions at the cellular and subcellular levels. References 10 (Russian).
[1-8831]

UDC 615.916+613.632]:546.49

NEW DATA ON TOXICITY OF INORGANIC COMPOUNDS OF MERCURY AND ON FACTORS RESPONSIBLE FOR IT

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 7, Jul 81 (manuscript received 19 Jun 80) pp 27-30

TRAKHTENBERG, I. M., KORSHUN, M. N., TERESHCHENKO, L. G. and TARASOVA, O. M., Institute of Labor Hygiene and Occupational Diseases, Kiev

[Abstract] Data are presented reflecting the acute toxicity parameters of 14 inorganic compounds of mercury. The toxicity of these compounds depends primarily on features of their chemical structure. The toxicity of inorganic mercuric salts is greater than the toxicity of mercurous salts. Toxicity parameters are given for various paths of entry of inorganic mercury compounds into the bodies of laboratory animals: perorally, epicutaneously and intraperitoneally. A high degree of correlation is observed between the ranks of toxicity parameters for all groups of compounds, thereby making it possible to assume that their effect is based on common mechanisms with all routes of entry into the body. These mechanisms determine to a considerable degree the entry, distribution and elimination of these substances and their primary biochemical reaction with biosubstrates of the body. The data presented confirm the fact that the solubility of the compounds studied does not influence their degree of toxicity as much as had been thought. Water-soluble mercury nitrate I is seven times less toxic than mercury nitrate II, but on the other hand is no more toxic than mercury chloride I which is practically insoluble in water. The toxicity of inorganic compounds of mercury is related insufficiently closely to properties characterizing to a certain extent the structure of their molecules and the energy of the interaction of molecules with other molecules. The data presented demonstrate that it is not possible to explain satisfactorily the toxicity of mercury compounds by relying only on a single indicator. A correlation analysis of toxicity parameters and a combination of physicohhemical properties reflecting the electronic and thermodynamic properties of molecules is required. References 13: 10 Russian, 3 Western.

[1-8831]

UDC 541.64

PROCESS OF PRODUCING LIGHT-FOCUSSING POLYMER COMPONENTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 7, Jul 80
(manuscript received 9 Dec 80) pp 1552-1558

GALIMOV, N. B., KOSYAKOV, V. I., MINKOVA, R. M., MOSEVICH, I. K.,
RAMAZANOV, A. N., TIKHONOVA, L. Yu., TUKHVATULIN, A. Sh. and SHEVCHENKO, M. L.,
Leningrad Polytechnical Institute imeni M. I. Kalinin and Institute of High-Molecular Compounds, USSR Academy of Sciences

[Abstract] The process of producing light-focussing polymer components based on diffusion and polymerization in the diallylisophthalate-methylmethacrylate system was investigated. The optimum conditions for diffusion of the methylmethacrylate monomer into a partially polymerized matrix of diallylisophthalate to achieve a given distribution of the refractive index through the cross-section of light-focussing polymer components were calculated. The effect of diffusion and polymerization conditions on the resulting distribution profile of the refractive index was studied experimentally. Variation of the diffusion coefficient with concentration of the compounds does not alter the optimum diffusion conditions and in some cases makes distribution worse compared to a constant diffusion coefficient. The distribution of the refractive index was the contribution of refraction of monomers and polymers to total refraction. The polymerization time must be selected as a function of temperature variation from 70 to 85 degrees to produce the required composition of the matrix. The distribution of the refractive index in the light-focussing polymer components varies at different temperatures and indicates that the time of copolymerization has little effect on the refractive index. Figures 8; references 7: 5 Russian, 2 Western.
[120-6521]

UDC 678.744-139]01:53

HEAT RESISTANT POLYMERIC COMPOSITION MATERIAL ROLIVSAN MV-1

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 81
(manuscript received 8 Feb 79) pp 12-13

ZAYTSEV, B. A., KHRAMOVA, G. I., DANTSIG, L. L., TSYGANKOVA, T. S.,
DOLMATOV, S. A. and SHAKAY, S. F.

[Abstract] Physical, mechanical, dielectric and thermal properties of the novel heat resistant polymeric Rolivsan MV-1 have been described. In the nonsolidified state, Rolivsan MV-1 has a monomer oligomer composition consisting of unsaturated esters and oligoesters. The principal advantage of this material is its ability to perform effectively in a wide range of temperatures ranging from -190 to 320°C. In the nonsolidified state MV-1 is soluble in ketones, esters, amides, in aromatic and chlorinated hydrocarbons; its $d_4^{25} = 1.10$, $n_D^{20} = 1.565\text{-}1.60$. The composition may be set with thermal, photochemical, radiation or catalytic methods. Depending on the setting method, polymers may be obtained from MV-1 with different structures, thermal stability and strength. In general, Rolivsan MV-1 has a unique combination of properties: liquid state of the starting composition, insignificant emission of volatile materials during solidification phase, low toxicity and high thermal stability, as well as valuable properties of the final polymer products. Figures 2; references 2 (Russian).
[15-7813]

UDC: 678.686;546.821]02

PRODUCTION OF EPOXY TITANIUM-CONTAINING POLYMERS IN PRESENCE OF AMINE CATALYSTS

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 81 pp 12-14

DUL'TSEVA, L. D., SUVOROV, A. L., SUVOROVA, A. I., KOCHNEVA, M. A.,
YEZHOVA, N. Yu., OVCHINNIKOVA, G. I., KRIVORUCHKINA, Z. S. and ALAD'YEVA, L. V.

[Abstract] Experiments were performed using type ED-20 and ED-22 epoxy resins with amine catalysts. The kinetics of the viscosity change in a number of systems studied were determined. The optimal catalyst content was found from the results of determination of thermal stability, thermomechanical properties and the content of the polymer ash fraction with various quantities of the catalysts. The use of amine accelerators was found to reduce the temperature and time of curing of the compositions while retaining good end product properties. Figures 2; references 7 (Russian).
[107-6508]

UDC: 678.019.34:621.315.616.97

CHEMICAL STABILITY OF PIK-220 ELECTRIC INSULATING IMPREGNATING COMPOUND

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 81 pp 20-22

SUSLOV, A. P., DOLMATOV, S. A., LEVSHANOV, V. S. and KANDYBKO, A. M.

[Abstract] A study is presented of the influence of oils and fuel on the properties of PIK-220 electric insulating impregnating compound which is based on PBMIA [polybismaleimidamines] at 140-200°C with exposures of 1000 hours and more. Specimens produced by pressing and heat treatment in air at 200 and 250°C for 16 and 3 hours were tested, the chemical stability of the compound determined by GOST 12020-72. The specimens were exposed to IPM-10 hydrocarbon oil, VT-301 organosilicon oil with an antioxidizing additive and T-8V fuel. It was found that in the process of formation of the polymer a layer is formed on its surface which hinders the diffusion of oxygen of the air into the internal layers and apparently participates in the process of curing. Thermal aging of PBMIA in media not containing oxygen obviously creates conditions for free-radical polymerization at the double bond and, possibly, attachment of primary and secondary amino groups to the double bond. This probably increases the cross-linking density and thus improves the mechanical and electrical strength. Figures 2; references 3: 1 Russian, 2 Western.
[107-6508]

UDC: 678.072:678.01:539

INFLUENCE OF TEST CONDITIONS ON MECHANICAL PROPERTIES OF PIK-220

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 81 pp 24-26

LEVSHANOV, V. S., SUSLOV, A. P., DOLMATOV, S. A., SHOLOKHOVA, L. A. and DUBINA, M. D.

[Abstract] Certificate data on the electric insulating impregnating compound PIK-220 were processed in order to determine the correlation between various indices and test conditions. The results of testing of the compound, 3 to 35 measurements for each test point, were statistically processed, clearly divergent data eliminated and estimates computed of the mean values, dispersion, coefficients of variation and confidence intervals. The dispersion of reproducibility for each test type was then computed. Computer calculation yielded equations adequately describing the variation in rupture stress in flexure, compression, modulus of elasticity and flexure, impact toughness and cementing capacity of PIK-220 for two types of wire as functions of temperature. Figures 4; references 4: 1 Russian, 3 Western.
[107-6508]

RUBBER AND ELASTOMERS

LOW-TEMPERATURE POSTRADIATION GRAFT POLYMERIZATION OF TETRAFLUOROETHYLENE TO POLYDIMETHYLVINYLSILOXANE RUBBER

Invano IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 5, May 81 (manuscript received 2 Jan 80) pp 627-630

ALLAYAROV, S. R., ASAMOV, M. K., KIRYUKHIN, D. P. and BARKALOV, I. M., Department of Physical Chemistry, Tashkent State University imeni V. I. Lenin

[Abstract] Low-temperature postradiation graft polymerization of tetrafluoroethylene to polydimethylvinylsiloxane rubber SKTV-1 was studied by the calorimetric method. The yield of graft polymerized tetrafluoroethylene increases as a function of the time the compound is aged at 273°K. The yield of graft polymerized tetrafluoroethylene also depends on the preliminary irradiation dose at 77°K and increases as the radiation dose increases. The tetrafluoroethylene must first be absorbed in the pores of crystalline polydimethylvinylsiloxane rubber for graft polymerization to occur. The yield of graft copolymer reaches 30 percent with preliminary irradiation dose of 0.28 MGr. Figures 3; references 9: 7 Russian, 2 Western.
[119-6521]

UDC 678.01:539.2;678.023.2

INVESTIGATING MECHANOCHEMICAL CHANGES OF STRUCTURE OF VULCANIZED RUBBER BASED ON CIS-POLYBUTADIENE DURING PULVERIZATION OF IT

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 5, May 81 (manuscript received 28 Dec 79) pp 634-638

IZYUMOVA, V. I., ZAKHAROV, N. D., KOSTRYKINA, G. I. and SHAKH-PARON'YANTS, A. M., Department of Chemistry and Technology of Elastomer Processing, Yaroslavl' Polytechnical Institute

[Abstract] The changes in the structure of vulcanized rubber exposed to mechanical effects during pulverization was investigated. Vulcanized rubber based on

cis-polybutadiene filled and unfilled with PM-75 commercial carbon, were used as the objects of investigation. The content of the ash fraction, the number of ruptures of molecular chains and the number of newly formed chains increase while the probability of secondary vulcanization processes decreases during pulverization of the rubber with an increase of particle dispersion. The infrared spectra of the ash fraction of pulverized vulcanized rubber differs from that of the ash fraction of initial vulcanized rubber and the presence of a filler determines the change in the structure. The relative content of links increases toward the position 1,2 and 1,4-trans for unfilled vulcanized rubber. The infrared spectrum of the ash fraction of filled vulcanized rubber based on cis-polybutadiene initially decreases in the range of 1,750-1,710 cm^{-1} to approximately 15 percent and then increases to the initial level. The structure of vulcanized rubbers varies during pulverization due to the effect of competing destruction-vulcanization processes. Part of the broken down fragments of the spatial grid becomes mobile and goes into the ash fraction and the products of pulverization retain a spatial or branched structure. Figures 1; references 13: 12 Russian, 1 Western.
[119-6521]

UDC 678.762-9-404:678.664:53

MOLECULAR CHARACTERISTICS OF URETHANE PREPOLYMERS BASED ON OLIGODIENE

Moscow KAUCHUK I REZINA in Russian No 8, Aug 81
(manuscript received 6 Aug 80) pp 8-9

VALUYEV, V. I., GORDEYEVA, S. B., ROMANOVSKIY, G. K. and SARAKUZ, O. N., All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev

[Abstract] The effect of synthetic conditions on the molecular mass distribution (MMD) of prepolymers was studied. The prepolymers were obtained by reaction of hydroxyoligodienes with 2,4-toluylenediisocyanate. The starting oligodiene used was a block copolymer of isoprene and butadiene containing terminal OH-groups. The MMD of prepolymers was determined by gelpenetration chromatography using the "Waters-200" instrument. Comparison of the MMD curves at various NCO/OH ratios showed that they flattened out and shifted toward higher molecular weight range in direct relationship to the lowering of the NCO/OH ratio. The viscosity of these prepolymers was inversely related to the NCO/OH ratio. The effect of the chain elongation on the polycondensation process was discussed. Figures 1; references 5 (Russian).
[10-7813]

UDC 678.01:548.517:678.046.2

EFFECT OF TECHNICAL CHLORINATED CARBON ON CRYSTALLIZATION OF cis-POLYBUTADIENE

Moscow KAUCHUK I REZINA in Russian No 8, Aug 81
(manuscript received 12 Feb 80) pp 14-15

SHELOMENTSEVA, I. V., KOSTRYKINA, G. I., LISTIKOVA, I. V. and
KORSAKOV, V. G., Scientific Research and Design-Construction Institute of
Carbon Pigments and Fillers

[Abstract] One of the most effective ways of altering the adsorptive properties of technical carbon is based on chemical modification leading to the formation of various reactive groups: =C=O, -COOH, $-NH_2$, Cl_2, on the surface of the filler. This study was devoted to the investigation of the effect of the crystallization of cis-polybutadiene impregnated with chlorinated carbon, - the technical carbon PM-100, treated with molecular chlorine in the gaseous phase. It was shown that with increased content of chemically-bound chlorine, the crystallization rate of cis-polybutadiene increases, decreasing somewhat the extent of this process. It was concluded that the extent of and the rate of crystallization depend on the content of chemically-bound chlorine. Figures 3; references 11: 9 Russian, 2 Western.
[10-7813]

UDC 678.01:(678.033+678.063):678.762.2-134.622

PROPERTIES OF VULCANIZATES AND RUBBER MIXTURES BASED ON SKMS-30ARKM15, MODIFIED WITH p-NITROSODIPHENYLAMINE AT LATEX STAGE

Moscow KAUCHUK I REZINA in Russian No 8, Aug 81
(manuscript received 30 Oct 79) pp 16-17

LEVIT, Ye. Z., PRYAKHINA, S. F., KOGAN, L. M. and SIRE, Ye. M.,
NIIKGSh (expansion unknown)

[Abstract] The aim of this study was to evaluate the properties of butadiene-styrene copolymers (BSC) modified with p-nitrosodiphenylamines (PNDPA). The experimental material consisted of the rubber SKMS-30ARKM-15-01, modified at the latex stage and containing different quantities of bound PNDPA. Optimal temperature and reaction rates for the reaction of the polymer with PNDPA were determined. It was shown that introduction of PNDPA into butadiene-styrene rubber had no effect on its elastic properties. The stabilizing activity of PNDPA bound to rubber was rather high. Such rubber showed increased resistance to thermooxidative and thermomechanical effects. It showed improved resistance to heat damage, better fatigue properties under conditions of repeated flexure in opposite directions and adequate elastic hysteresis. Figures 2; references 8: 5 Russian, 3 Western.
[10-7813]

UDC 678.7.01:546.268.2:547.565.2:547.288.15

REACTION OF OLIGODIENEDIISOCYANATES WITH RU PRODUCTS IN RUBBER MEDIUM

Moscow KAUCHUK I REZINA in Russian No 8, Aug 81
(manuscript received 8 Jan 80) pp 18-20

LANOVSKAYA, L. M., MANUYLOVA, G. L., KLENOVA, N. I. and KOFMAN, L. S.,
Scientific Research Institute of the Tire Industry

[Abstract] Modification of isoprene rubbers in presence of the system: oligodienediisocyanate (ODDI) - RU product [RU is a molecular complex of hexamethylenetetramine (HMTA) and resorcin (R)] occurs by the reaction of the components of this system under conditions of vulcanization. The reactions occuring in a binary system ODDI + RU were compared with those prevalent in the system ODDI + RU + SKI-3. Several competing reactions were found to take place in the rubber medium. The experimental data indicated that study of model systems does not sufficiently represent the complexity of interactions occuring during the rubber vulcanization. Reactions are possible between SKI-3 and the products of the ODDI-RU interactions as well as with individual components of ODDI and RU. On the basis of experimental results, one could not claim that, in a rubber medium, the ODDI trimerization or correspondingly its migrational copolymerization with resorcin component of the RU could alone determine the modifications in the rubber. References 7 (Russian).
[10-7813]

UDC 678.684.82.01

USE OF SYNTHETIC LATEXES FOR MODIFICATION OF THIOCOL AIR TIGHT SEALERS

Moscow KAUCHUK I REZINA in Russian No 8, Aug 81
(manuscript received 24 Mar 81) pp 24-26

GARIPOVA, R. A., AVERKO-ANTONOVICH, L. A., VAKHONIN, A. P. and SKRYLEVA, V. V.,
Kazan' Institute of Chemical Technology imeni S. M. Kirov, Kazan' Synthetic Rubber Plant

[Abstract] The properties of air-tight sealers based on polysulfide oligomer (PSO) were evaluated as a function of the type and the content of latex and filler. Synthetic latexes mix easily with the paste consisting of the PSO and filler, but on prolonged storage they undergo spontaneous vulcanization. This is due to the fact that components of the latex accelerate oxidation of polysulfide oligomer with air oxygen. It was found that the properties of these vulcanizates depend not so much on the type of latex used as on its concentration. Therefore it was recommended to use concentrated latexes, up to 30 parts by weight. Relative elongation of vulcanizates increased when titanium oxide was used as the filler. As a rule, with increased levels of the fillers, the durability of the compositions increased. The materials prepared from PSO modified with

synthetic latexes are comparable with the standard air-tight sealers in respect to frost resistance and swelling in various solvents, but they are much less expensive. Figures 1; references 6 (Russian).
[10-7813]

UDC: 678.044(088.8)

INFLUENCE OF PHOSPHORUS-CONTAINING ACCELERATORS ON PROPERTIES OF SKEPT VULCANIZATES

Moscow KAUCHUK I REZINA in Russian No 6, Jun 81
(manuscript received 26 Mar 80) pp 8-9

RATNIKOVA, T. V. and DAVYDOV, B. Yu., Leningrad Institute of Technology imeni Lensovet

[Abstract] Ethylene propylene diene rubbers (SKEPT) limit the "blooming" of sulfur on the surface of rubbers vulcanized with thiuram accelerators. This article presents a study of the influence on the properties of SKEPT-based rubbers of phosphorus-containing accelerators of the octaalkyltetraamidothiopyrophosphate (TPF) class. The optimal dosage of the TPF accelerators and sulfur were determined by two-factor central composition experimental planning. The new phosphorus-containing accelerators were found to increase the 300% elongation stress from 8-9 to 11-16 MPa, the tensile strength from 10-16 to 18-23 MPa and the puncture resistance from 30-33 to 49-69 kN/m. Figures 2; references 6: 4 Russian, 2 Western.
[106-6508]

UDC: 541,64+678.405

ESTIMATING PROPERTIES OF SKEPT-40 RUBBERS

Moscow KAUCHUK I REZINA in Russian No 6, Jun 81
(manuscript received 1 Feb 80) pp 10-12

POGOREL'SKAYA, V. P., SALOVA, S. F., GALIL-OGLY, F. A. and DONTSOV, A. A., Voronezh Technological Institute

[Abstract] To determine the formation of ethylene and propylene microblocks in ethylene propylene rubbers, relaxation processes were studied in polymers using a torsional pendulum and an electronic circuit for recording of oscillations at a nominal frequency of 1 Hz in the -196 to +197°C temperature area. The temperature variation of mechanical loss angle tangent (logarithmic decrement of attenuation of free oscillations) shows several maxima, including one at 120°C, the position of which is not constant (± 10°C), caused by fusion of crystalline microblocks formed of ethylene monomer elements with $n \geqslant 5$. The studies establish the presence of both ethylene and propylene microblocks in SKEPT-40.

Experimental data on the variation of the technological properties of rubber and physical-mechanical characteristics of polymer chain structure indicate that the optimal content of $(-CH_2-)_n$ with $n \geqslant 5$ is 42-44%, with $n = 1$, 2 or 3 - about 56-58%. Figures 5; references 9: 5 Russian, 4 Western.
[106-6508]

UDC: 678.01:541.24:768.763.2:678.033.3.01

INFLUENCE OF MOLECULAR MASS OF MERCAPTAN REGULATION POLYCHLOROPRENES ON TECHNOLOGICAL PROPERTIES

Moscow KAUCHUK I REZINA in Russian No 6, Jun 81
(manuscript received 3 Jul 80) pp 12-15

URAL'SKIY, M. L., MURADYAN, D. S., GORELIK, R. A. and EMYAN, E. Zh.,
"Kauchuk" MPO, "Nairit" NPO

[Abstract] A study is presented of mercaptan regulation polychloroprenes. The technological properties of the polychloroprenes were determined in accordance with the state standard, ASTM D 11646 (Mooney viscosity decrement) as well as the capillary and rotation viscosimetry methods. The polychloroprenes studied can be divided into two groups on the basis of elastic-plastic and rheologic properties: rubbers with high effective viscosity and capability for accumulation of elastic deformation energy, and those with relatively lower characteristics. The polychloroprenes studied manifest a tendency toward significant increases in the tendency toward undervulcanization as well as vulcanization rate with increasing $\overline{M}_\eta$ of the specimens. Figures 4; references 9: 6 Russian, 3 Western.
[106-6508]

UDC: 678.19.9

USE OF HEXACHLOROPARAXYLENE IN RUBBER MIXTURES BASED ON SKEPT WITH BUTADIENE COPOLYMERS

Moscow KAUCHUK I REZINA in Russian No 4, Jun 81
(manuscript received 14 Jan 80) pp 16-17

PLEKHANOVA, A. L., CHEKANOVA, A. A., ZAKHAROV, N. D. and YABLOKOVA, O. A.,
Yakutsk Polytechnical Institute

[Abstract] A study was made of the properties of rubbers formed from a combination of SKEPT with butadiene-styrene and butadiene-nitrile rubbers, the vulcanizing group of which contains HCPA. The HCPA was introduced to the SKEPT on rolls at 90°C at 3 minutes before it was mixed with the remaining ingredients. Vulcanization was conducted at 160°C in an electric press. It was found that HCPA greatly increased tensile strength between phases, indicating the formation of bonds at the phase separation boundary, i.e., covulcanization. HCPA thus has a

modifying effect in rubber mixtures based on combinations of polymers differing in degree of saturation, leading to improvement of the properties of the vulcanizates. Figures 2; references 6: 5 Russian, 1 Western.
[106-6508]

UDC: 678.762.2+678.762.2-134.622.063

INFLUENCE OF MECHANICAL GRINDING OF SKD AND BSK RUBBERS ON STRUCTURE AND PROPERTIES OF THEIR VULCANIZATES

Moscow KAUCHUK I REZINA in Russian No 6, Jun 81
(manuscript received 7 Jul 80) pp 23-26

KHVEDCHENYA, O. A., KOSTRYKINA, G. I. and ZAKHAROV, N. D.

[Abstract] A study is presented of the influence of mechanical grinding of SKD and BSK rubbers on the structure and properties of their vulcanizates. The rubbers were ground without deagglomerating additives on a laboratory hammer crusher in air at 20°C at a hammer speed of 100 m/s. The mean particle size was 3.15 mm for SKD, 2.79 mm for SKMS-30ARK rubber. Grinding was found to influence the formation of the vulcanization structure of both rubbers identically. Acceleration of vulcanization and an increase in the degree of cross linking were observed for mixtures with accelerators which favored the radical nature of the cross linking reaction. The influence of grinding on the structure of filled rubbers is more complex than in the case of nonfilled rubbers. The nature of the influence of mechanical grinding of SKD and BSK on the structure and properties of the rubbers depends to a great extent on the composition of the mixtures. If the mixing factors are properly selected, rubbers can be produced which are equal to or superior to rubbers based on block raw rubber. Figures 3; references 13 (Russian).
[106-6508]

UDC: 678.763.2:678.028:678.4.01:546.4/.5

PROPERTIES OF SULFIDE VULCANIZATES OF SR NAIRITE

Moscow KAUCHUK I REZINA in Russian No 6, Jun 81
(manuscript received 10 Jul 80) pp 31-32

NOSNIKOV, A. F., VAS'KOVSKAYA, M. A. and OLENICH, N. N., Institute of Chemical Technology imeni F. E. Dzerzhinskiy

[Abstract] A study is presented of the cross linking of SR nairite by barium sulfide, a very cheap metal sulfide. The study was performed in the presence of 5 parts by weight of DG-100 technical carbon during vulcanization in a press at 153°C for 5-90 minutes based on the change in elastic-strength properties and

concentration of transverse vulcanizate bonds. The minimum viscosity of the sulfide mixture at 120°C is approximately 1/3 as great, the time of beginning of subvulcanization more than 3 times greater than that of the standard mixture, an important advantage of sulfide rubber mixtures from the standpoint of technology of production and processing of mixtures into products. The experimental rubber also has greater thermal stability and resistance to repeated extension, oil, oleic and concentrated hydrochloric acid and water than the metal oxide rubber. Figures 2.
[106-6508]

UDC: 541.697

ESTIMATING TOXICITY OF DIMETHYLPHENYLCARBINOL

Moscow KAUCHUK I REZINA in Russian No 6, Jun 81
(manuscript received 5 Nov 80) pp 55-57

LOPATNEVA, Zh. Ya., BALABANOVA, S. G., REUTOVA, N. A. and DOLOZHITSKIY, S. L.,
Leningrad Branch, Scientific Research Institute of Rubber Products

[Abstract] A study is presented of the toxicity of dimethylphenylcarbinol. The experiments were performed on white rats and mice. Hematological, physiological and biochemical tests were used. The LD50, threshold dose, and acute inhalation toxicity were determined. The substance was found to have slight cumulative properties. The LD50 for both white mice and white rats was approximately 2000 mg/kg, the threshold dose for 1-time peroral administration 106.7 mg/kg, the threshold concentration for acute inhalation 360 mg/m^3, for chronic inhalation 15 mg/m^3. A concentration of 5 mg/m^3 has no effect, and is recommended as the MPC. References 12 (Russian).
[106-6508]

NEW TIRE DESIGNS AND THEIR EFFICIENT USE IN THE NATIONAL ECONOMY

Moscow KAUCHUK I REZINA in Russian No 9, Sep 81 pp 3-7

BADENKOV, F. F., Scientific Research Institute of the Tire Industry

[Abstract] Advances in tire design and in the automobile industry during the last 10 years are discussed. The production of new vehicles with a greater load-bearing capacity and the increasing use of trailers and semitrailers, buses and economy cars necessitated the development of new types of tires, capable of withstanding the greater loads, while also lighter in weight and having a longer service life. Tires produced within the 10th Five-Year Plan included second-generation radial tires with a 25% longer life than first-generation radials and light-duty radial tires with metal cord breakers. New-design tires also had higher maximum allowable speeds. Tires with metal cord breakers performed

better on wet and dirt roads, wore out less rapidly and more uniformly, and decreased fuel consumption. These new developments in the tire industry were also concurrent with the development of new types of rubber and cord and advances in equipment and technology used in tire manufacturing. Tire production also increased within the last 10 years: more than 1.4-fold in the case of truck tires and 3.1-fold in the case of passenger car tires. Radial tire production was still low in 1980 and greater tire production is one of the goals of the 11th Five-Year Plan, as well as the production of tires of more uniform quality by different plants. Figures 2; references 6 (Russian).
[21-9307]

UDC 678.744.32-139.03

PROPERTIES OF ACRYLATE RUBBERS WITH DIFFERENT REACTIVE GROUPS

Moscow KAUCHUK I REZINA in Russian No 9, Sep 81
(manuscript received 18 Jun 80) pp 10-12

SUVOROVA, E. A., FOMICHEVA, M. M., GRINBLAT, M. P. and KHRUSTALEVA, T. D.,
All-Union Scientific Research Institute of Synthetic Rubbers im. S. V. Lebedev

[Abstract] A model acrylate copolymer with an epoxy group was synthesized to study the effect of reactive groups on the properties of rubbers and their vulcanizates. The copolymer with the epoxy group had better low-temperature properties and a four-fold higher vulcanization rate than the acrylate rubber BAKKh-7, while containing half the amount of potassium stearate. Its vulcanizates had greater tensile strength, lower speiific residual elongation and better resistance to aging in an unstressed state than the BAKKh-7 vulcanizates. In a compressed state, heat resistance at 150°C of the vulcanizates of the copolymer with the epoxy group was lower than that of BAKKh-7 vulcanizates. These differences were due to the nonuniform distribution of functional groups in BAKKh-7 during polymerization and the density and type of vulcanization network. Figures 3; references 6 (Russian).
[21-9307]

UDC 678.44.028:678.743.41

VULCANIZATION OF FLUORINE RUBBER SKF-26 BY THIOUREA DERIVATIVES

Moscow KAUCHUK I REZINA in Russian No 9, Sep 81
(manuscript received 7 Jul 80) pp 19-23

SIMANENKOVA, L. B., DONTSOV, A. A., NOVITSKAYA, S. P. and KIRO, Z. B.,
Scientific Research Institute of the Rubber Industry

[Abstract] Alkyl- and aryl-substitute thioureas were evaluated as vulcanizing agents. Alkyl-substituted thioureas were more active than aryl-substituted

thioureas, with compounds with ethylene bridges between thiourea fragments exhibiting the greatest activity. Vulcanization activity was inversely proportional to the heat stability of thiourea derivatives. After heat curing, the degree of cross-linking and strength of vulcanizates with alkyl-substituted thioureas increased and specific and residual elongation decreased. An increase in curing time or temperature during 30-min vulcanization increased the degree of cross-linking in vulcanizates. As the content of the vulcanizing agent increased from 1 to 6 parts by wt., the degree of cross-linking in pressed and heat-cured vulcanizates also increased and residual and specific elongation decreased. Addition of a mineral filler, potassium fluoride, increased the strength of heat-cured vulcanizates and resistance to heat aging. Cross-linking of rubber with use of thiourea derivatives was a two-stage exothermic process and was due to potent nitrogen-containing nucleophilic reagents formed during decomposition of thiourea derivatives. Figures 2; references 5 (Russian).
[21-9307]

UDC 678.4.063.01:539.24

DETERMINATION OF DEGREE OF CROSS-LINKING IN ELASTOMER PHASES IN FILLED SULFUR VULCANIZATES OF COMBINATIONS OF SKI-3 AND SKMS-30ARK RUBBERS

Moscow KAUCHUK I REZINA in Russian No 9, Sep 81
(manuscript received 21 May 81) pp 27-29

SHVYDKAYA, N. P., SHUMANOV, L. A. and LYKIN, A. S., Scientific Research Institute of the Tire Industry

[Abstract] A method for determining the degree of cross-linking in elastomer phases, cross-linking kinetics of vulcanizates and correlation between properties of the overall system and its components were studied. The physicomechanical properties of carbon-filled PM-100 vulcanizates of SKI-3 and SKMS-30ARK rubbers and their combinations were determined. The degree of cross-linking was calculated by a formula correlating the degree of swelling of individual rubbers and their combinations in solvents (toluene, heptane) and the amount of each constituent; the ash content was also determined. Tensile strength and stress during 300% elongation of various rubber combinations were characterized by curves with a maximum, and specific elongation by curves with a minimum. Figures 4; references 10: 9 Russian, 1 Western.
[21-9307]

UDC 678.4.063.01:536.485; 678.762.2-134.532; 678.4.049

MALEATES AS PLASTICIZERS FOR RUBBER MIXTURES

Moscow KAUCHUK I REZINA in Russian No 9, Sep 81
(manuscript received 6 Jul 80) pp 39-40

ZAYTSEVA, T. P., YEVCHIK, V. S., MARKOVA, L. A. and ZAPOROZHETS, V. D., DF NIIRP [Dnepropetrovsk Branch of the Scientific Research Institute of the Rubber Industry?] and LNPO Pigment [Leningrad Scientific Planning Section "Pigment"?]

[Abstract] The plasticizing activity and compatibility with rubbers of isobutylmaleate, diisobutylmaleate and dibutylmaleate were studied. All maleates tested were highly compatible with polar rubbers SKN-18, SKN-26, SKF-32 and SKF-26 and chloroprene rubber, but less compatible with nonpolar rubbers. All maleates except dibutylmaleate conferred the same properties on rubbers as standard plasticizers. Dibutylmaleate had a stronger plasticizing effect, and increased specific and residual elongation and the cold-resistance coefficient; resistance to deformation remained relatively high. The maleates did not affect vulcanization rates. The maleates tested are recommended as plasticizers for rubber mixtures with butadiene nitrile rubbers or their combinations with chloroprene rubber, which are used to fabricate products for use at temperatures up to 100°C. References 5 (Russian).
[21-9307]

UDC 621.869.4-83

LIFE OF SOLID-RUBBER TIRES FOR ELECTRIC LOADERS

Moscow KAUCHUK I REZINA in Russian No 9, Sep 81
(manuscript received 15 Oct 80) pp 46-47

ALEPIN, Ye. A. and LIPOVETSKAYA, A. K.

[Abstract] The working conditions of solid-rubber tires on electric loaders were analyzed. The service of standard tires was 900-1100 h for guide wheels and 600-700 h for drive wheels. This was related to the type of work performed by loaders and load exerted on wheels. Guide wheels operated more than 50% of the time at the rated load. The wear of tires on guide wheels was also 1.5-fold greater than on dirve wheels, because of the greater turning angle. To ensure uniform wear on tires on drive and guide wheels, the design of these tires should specify a guide-tire load that is about 30% lower than the allowable load. Figures 1; references 1 (Russian).
[21-9307]

UDC 547.413.5:542.943.7

PRODUCTION OF DERIVATIVES OF MALEIC ANHYDRIDE BY CATALYTIC OXIDATION OF HALOGEN BUTADIENES

Moscow NEFTEKHIMIYA in Russian Vol 21, No 3, May-Jun 81
(manuscript received 4 Aug 80) pp 435-439

EFENDIYEV, A. D., SHAKHTAKHTINSKIY, T. N., SADYKHOVA, Kh. I., ALIYEVA, S. A. and AGA-ZADE, A. G., Institute of Theoretical Problems of Chemical Technology, Azerbaijan SSR Academy of Sciences, Baku

[Abstract] Methods of vapor-phase heterogeneous-catalytic oxidation of chloroprene and hexachlorobutadiene were developed to produce chloromaleic and dichloromaleic anhydrides and to determine the conditions that provide selective oxidation of them. The oxidation of chloroprene to chloromaleic acid was accomplished with air oxygen in a fluidized bed of vanadium-phosphorus catalyst under laboratory conditions. The highest yield of chloromaleic acid was obtained at optimum temperature of 470°C and contact time of 0.80 second. The catalyst produces 203 grams of chloromaleic acid per liter per catalytic hour. An optimum temperature of 480°C and contact time of 0.70 second were determined in the oxidation of hexachlorobutadiene to dichloromaleic anhydride in a V-P catalyst. Figures 2; references 6: 4 Russian, 2 Western.
[127-6521]

UDC 547.363:542.91

PRODUCTION OF PIPERYLENE EPOXIDES

Moscow NEFTEKHIMIYA in Russian Vol 21, No 3, May-Jun 81
(manuscript received 14 Jul 80) pp 440-443

MENYAYLO, A. T., (deceased), POSPELOV, M. V., KIRILASH, N. N. and KIRKUN, I. M., All-Union Scientific Research Institute of Organic Synthesis

[Abstract] Various methods of piperylene epoxidation, using perphthalic acid (PPA), tert-butyl hydroperoxide or 30 percent hydrogen peroxide were compared. The PPA was prepared from phthalic anhydride and 25 percent hydrogen peroxide at temperature no greater than -15°C. The conditions for epoxidation of the piperylene by PPA, with various ratios of reactants, is described; the product is a mixture of 1,2- and 3,4-monoxides of piperylene. The low content of byproducts indicates the high selectivity of the reaction in formation of monoxides. The methods for epoxidation with hydroperoxide tert-butyl and with the hydrogen peroxide are also described. In all cases a mixture of 1,2- and 3,4-epoxypentenes (with yield of 90, 80 and 70-80 percent respectively) was produced for the three epoxidants. The yields, depending on the initial epoxidating agent, were 25-30, 60 and 45 percent. Small quantities of piperylene dioxide are formed, with the greatest amount being produced in the epoxidation of piperylene by tert-butyl hydroperoxide. References 14: 9 Russian, 5 Western.
[127-5621]

DECISIONS OF 26TH CPSU CONGRESS REGARDING WATER TREATMENT ENACTED

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 4, Jul-Aug 81 pp 291-293

[Abstract] A major goal set by the 26th CPSU Congress is the desalination of water supplies which have become contaminated by mineral salts, chiefly sodium chloride and sulfate, deposited with industrial wastes and mining water. This task is of special importance with regard to increasing populations of marketable fish. The thermal method of desalination is being used in the city of Shevchenko, but this method requires a high input of energy and results in fresh water obtained at a high cost. The necessity has come to a head of developing and making wide use of combined methods of desalination, including electrodialysis, reverse osmosis and ion exchange methods. Preference is to be given to the reverse osmosis method, which is the cheapest method of obtaining fresh water. The desalination of brine is to be accomplished by the thermal method. It is stressed that it is necessary to develop a technology for the thorough processing of mineralized waste, ocean and ground water for the purpose of producing from it calcium carbonate and calcium sulfate, magnesium oxide, sodium sulfate, sodium chloride and other products used extensively in the economy. A waste-free technology has been developed for the thorough processing of mine water with separation of the slurry for use in the production of building materials and chemicals. The desalination part of this process is accomplished by means of membrane methods. Hygienists and physicians have been doing a great deal of work relating to norm setting, which has resulted in a sudden increase in the number of components for which norms have been set. At the present time maximum permissible concentrations have been established for 640 components. This number is expected to grow. The maximum permissible concentrations for many components are very low and must be because the toxicological effect of impurities is often additive. There is a lack of well-developed methods of determining especially organic substances in water and this gap between the number of components for which norms have been set and methods of assaying these components must be closed. Methods must be developed for concentrating microimpurities, especially methods for the group concentration of substances identical in toxicity. For the determination of organic substances in water it is necessary to make advances in chromatomass-spectroscopy and chromatoluminescence and chromatochemiluminescence methods of analysis. There is an urgent need to make extensive use of automatic methods of monitoring and controlling the level of contamination of water reservoirs.

[146-8831]

UDC 541.183+628.54

MECHANISM OF INTERACTION OF PESTICIDES WITH LAYER SILICATES

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 4, Jul-Aug 81
(manuscript received 19 Jan 81) pp 294-304

TARASEVICH, Yu. I., Institute of Colloid Chemistry and Chemistry of Water
imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Many pesticides can be removed effectively from water by means of natural mineral sorbents such as bentonites. However, there has been a lack of systematized data on which pesticides are effectively absorbed by natural sorbents, on the absorption capacity of these absorbents in relation to pesticides and on the interaction mechanism in the mineral sorbent-aqueous solution of pesticide system. The great amount of experimental data accumulated makes it possible to answer these questions and a brief analysis is presented of major studies on sorption and the mechanism of the sorption interaction of various pesticides with layer silicates. It is demonstrated that the mechanism of the interaction of pesticides with layer silicates depends on the state of pesticide molecules in the solution, the pH of the medium, the type of sorbent and its kind of exchange cation. Pesticides are divided into three groups in terms of their state in an aqueous solution: anionic, cationic and nonionic. With a pH close to neutral these substances exist in solution in the form of anions, cations and nonionized polar molecules, respectively. Anionic pesticides can be adsorbed from aqueous solutions with a pH of 7 only on positively charged sections of the surface of layer silicates. The adsorption capacity of layer silicates is quite low in relation to anionic pesticides since the number of positively charged sections of the surface is considerably lower than the number of negatively charged centers. If the charge of organic anions is greater than one they can be sorbed on layer silicates from aqueous solutions by the mechanism of complex formation with polyvalent exchange cations. Here it is necessary that the complex not be negatively charged. Use of layer silicates is generally ineffective for the adsorption of anionic pesticides in an aqueous solution in the form of anions. Cationic pesticides are beginning to be used more and more in agriculture. They are adsorbed by layer silicates by an ion exchange method which results in an equivalent number of inorganic cations being expelled from the surface of the silicates into the solution. Vermiculite and montmorillonite are best for adsorbing cationic pesticides. The nonionic pesticides most widely used in agriculture are derivatives of symmetric triazines. Equilibrium reactions are presented for the interaction of derivatives of symmetric triazines with layer silicates in water. For the effective sorption of pesticides of the symmetric triazine derivative type on montmorillonite and other layer silicates the pH of the contaminated water must be reduced to the pK_a values of the substances to be extracted. It is possible to control over a rather wide range the adsorption properties of montmorillonite in relation to nonionic pesticides by substituting the natural exchange complex of the mineral with other cations. The sorption capacity of montmorillonite for organic substances dissolved in water can be increased by replacing its inorganic cations with short-chain organic cations of the tetramet-yl ammonium type. It is emphasized that by knowing the mechanism

of interaction in the pesticide-water-mineral system it is possible to purposefully select specific natural layer silicates and sorbents obtained by chemical and geometric modification for the purpose of effectively removing pesticides from water. Figures 3; references 75: 32 Russian, 43 Western.
[146-8831]

UDC 621.359.7

ELECTROSTATIC PRECIPITATION OF DISPERSIONS BY USING ION EXCHANGE MEMBRANES

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 4, Jul-Aug 81
(manuscript received 2 Apr 81) pp 304-307

DUKHIN S. S., GREBENYUK, V. D., PONOMAREV, M. I. and GRECHKO, S. V.,
Institute of Colloid Chemistry and Chemistry of Water imeni A. V. Dumanskiy,
Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The electrostatic precipitation method is investigated as a method for removing dispersed substances from solutions. Particular attention is paid to aspects of the kinetics of the precipitation of a dispersed phase on polarized ion exchange membranes. Experiments were conducted with a three-chamber electrochemical cell with two electrode chambers separated from the central by means of two membranes of the same type or by an anion and cation exchange membrane. The membranes were 1 cm apart and the height of their working section was 4 cm. A dispersion of Cherkassy montmorillonite in 0.001 N NaCl with a particle grain size of about 0.5 μ was admitted through the central chamber from bottom to top. A 0.5 N solution of KNO_3 circulated in the electrode chambers. The difference in concentrations of the suspension at the inlet to and outlet from the cell was used to determine the amount of montmorillonite which had precipitated on the membrane. The solution was sampled from the central chamber through two ducts located directly on the surface of both membranes. It was observed that the conditions for the formation of a precipitate are essentially different for cation exchange and anion exchange membranes. In the vicinity of an anion exchange membrane polarization interaction of double layers of particles and the substrate is responsible for the formation of a dense precipitate which adheres well to the membrane. In the case of a fluid containing negatively charged particles the first layer of precipitate adheres to an anion exchange membrane because of forces of attraction between the positive charge of the anion exchanger and the negative charge of the particles. In the vicinity of a cation exchange membrane the first layer of particles can adhere to its surface only on account of polarization interaction since the ion exchanger and particles are charged identically. Here however polarization interaction is diminished because of the lower field strength on the delivery side of the membrane as compared with the bulk of the solution. Electroosmosis is given as another factor responsible for the precipitation of particles of montmorillonite on the surface of an anion exchange membrane. The amount of extracted montmorillonite is shown to depend practically linearly on the duration of electrostatic precipitation. The effectiveness of removal is influenced by the type of membranes on either side

of the central chamber. The maximum precipitation rate is achieved by using two cation exchange membranes, the minimum by using two anion exchange and a middle rate with a combination of the two. Figures 5; references 8 (Russian).
[146-8831]

UDC 66.067.38

INVESTIGATION OF DIFFUSION OF IONS IN PURIFICATION OF WATER BY REVERSE OSMOSIS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 4, Jul-Aug 81
(manuscript received 18 Dec 80) pp 315-317

EMAN, M. I., JUZ'MITSKAYA, N. Ye. and FISHMAN, G. I., Scientific Research Institute of Plastics, Moscow

[Abstract] In the diffusion flow model of the process of the separation of aqueous solutions by reverse osmosis proposed by M. I. Eman (1980), with the lack of concentration polarization the relationship between the permeability, G, in m/s, of the membrane and the degree of transfer of an impurity through it, E, with variable pressure, P, in Pa, of the solution to be separated, is described by the equation $E = K \exp (BG)/[K + \exp (BG) - 1]$, where $E = c_2/c_1$; c1 and c_2, in kg/m^3, represent the concentration of the solution to be separated and of the filtrate, respectively; and B, in s/m, and K are parameters of the membrane-solution system in question, which are constants with a constant temperature and concentration of the solution to be separated and an unchanged porous structure of the active layer of the membrane. $B = h/\alpha D$, where h, in m, is the effective thickness of the active layer, α is its porosity and B, in m^2/s, is the diffusion coefficient of the impurity in the capillary water of the active layer. Parameter K is the coefficient of distribution of the impurity between the boundary layer of the solution at the surface of the membrane and the solution to be separated in the space. A verification is made of the validity of the above equation in the case of separating a 0.15 N solution of hexamethylene diamine hydrochloride on an MGA-95 membrane, and an estimate is made of the effectiveness of using a membrane for purifying waste water containing this compound (designated as GMD·2HCl). Experiments were carried out at 25°C and the concentration of GMD·2HCl in the solution was determined by means of an argentometer. Emphasis is placed on the value of P_{opt}, the optimum pressure of the solution to be separated. It is shown that in the case investigated here P_{opt} will lie within the range of 2 to 4 MPa. Since a pressure of 5 MPa is normal for functioning of an MGA-95 membrane it is considered an optimum membrane for purifying waste water from polyamide production processes. P_{opt} is not lower than 4 to 5 MPa for purifying the waste water from polycarbonate production. It is necessary to create new membranes for this purpose. Figures 2; references 5 (Russian).
[146-8831]

UDC 628.165:621.187.12

INFLUENCE OF VOLTAGE AND RATE OF FLOW ON TRANSFER OF IONS IN ELECTRODIALYZER

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 4, Jul-Aug 81
(manuscript received 1 Dec 80) pp 317-321

VYSOTSKIY, S. P. and KOPYLOVA, O. N., Southern Branch of the All-Union Heat
Engineering Institute imeni F. E. Dzerzhinskiy, Gorlovka

[Abstract] The effectiveness of the employment of electrodialyzers in water desalination systems is characterized by the unit flow of ions through the surface of ion exchange membranes. Results are given here of an investigation of parameters for the desalination of coagulated lime water which has first undergone prepurification in clarifiers and has been passed through mechanical filters. The dialyzate flows in the chambers for a length of 1.2 and 2.4 m in an experimental industrial unit. Woven netting 1.5 mm thick is used as spacers. With the same unit an investigation was made of parameters for the desalination of water containing only table salt for the purpose of estimating the separate transfer of cations and anions through the membranes. An FPL-1 flame photometer was used to determine the content of sodium cations in the dialyzate and concentrate and hardness was determined trilonometrically with a dark blue acidic chromium indicator. The content of chlorine and sulfate ions was determined respectively by titration with mercury nitrate with a diphenyl carbazone indicator and with barium chloride with "Nitkhromazo" as an indicator. A Damkohler number equation is derived which characterizes the process of electrodialysis desalination. The experimental data were processed by the method of least squares on a Nairi-K digital computer. It is demonstrated that increasing the rate of flow in electrodialyzers makes it possible to increase considerably the unit flow of ions through the surface of ion exchange membranes and thus to improve the effectiveness of the employment of electrodialyzers. With an increase in the rate of flow of the dialyzate there is an increase in the polarization characteristics of MK-40 and MA-40 ion exchange membranes. Accompanying this phenomenon is an increase in the excess transfer of hydroxyl ions, i.e., not neutralized by the hydrogen ion, through anion exchange membranes. The flow of ions through membranes is directly proportional to the voltage supplied to a cell and the rate of flow of the dialyzate. Figures 3; references 5 (Russian).
[146-8831]

UDC 628.162.8

DECONTAMINATION OF WASTE INDUSTRIAL WATER CONTAMINATED WITH ZINEB

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 4, Jul-Aug 81
(manuscript received 8 Dec 80) pp 352-354

MARCHENKO, V. M. and TARAN, P. N., Institute of Colloid Chemistry and
Chemistry of Water imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences,
Kiev

[Abstract] Zineb is widely used in agriculture because of its high fungicidal effectiveness, the simplicity of producing it and the accessibility of raw material. The results are given of an investigation of an oxidation method of effectively treating waste water contaminated with zineb and its biologically active metabolites. Oxidation was carried out in dilute approximately 10^{-4} M aqueous solutions. The zineb used was in the form of an 80-percent-moistened powder containing additions of ethylene thiourea and ethylene thiuram monosulfide. Chlorine and ozone were used as oxidants. A borate buffer with a pH of 11.0 was used to compensate the reduction in the pH of the solution during oxidation. Samples were treated prior to analysis with a solution of sodium thiosulfate for the purpose of breaking down the oxidants and stopping oxidation. Experiments were conducted with zineb solutions with concentrations of 27.5 and 137.5 mg/liter. A special procedure was employed in order to dissolve the zineb since it is practically insoluble in water. The carbon bisulfide group method of analysis was used, making it possible to monitor the content of compounds with a C-S bond in the solution. Aqueous solutions of chlorine were used and ozone was supplied with a laboratory ozonizer. The data obtained demonstrate that chlorine oxidizes, sufficiently effectively, aqueous solutions of zineb. The consumption of oxidant practically ceases after the disappearance of zineb and its metabolites in the water. Thirteen moles of chlorine per one mole of zineb, or 3.3 mg/mg, are required for the total decomposition of the zineb. The end products of the reaction are sulfates, sulfur and a substance with an aldehyde group. After two 24-h periods all the sulfur atoms in a molecule can be oxidized to sulfates. A 10-fold molar excess of chlorine is necessary for the total decomposition of ethylene thiourea. Zineb in aqueous solution is oxidized intensely by ozone but the oxidant is consumed even after the disappearance of the substance to be oxidized in the treated water. A 5-fold molar excess of ozone is required for the decomposition of ethylene thiourea. Sulfates are the main decomposition product. A dose of 1.22 mg/mg of ozone is required to eliminate zineb. Figures 3; references 4 (Russian).
[146-8831]

CSO: 1841 - END -

END OF FICHE

DATE FILMED

DEC 31-81